

B O A R D O F S T U D I E S
NEW SOUTH WALES

Information Processes and Technology

Stage 6

Syllabus

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1 The Higher School Certificate Program of Study

The purpose of the Higher School Certificate program of study is to:

- provide a curriculum structure which encourages students to complete secondary education;
- foster the intellectual, social and moral development of students, in particular developing their:
 - knowledge, skills, understanding and attitudes in the fields of study they choose
 - capacity to manage their own learning
 - desire to continue learning in formal or informal settings after school
 - capacity to work together with others
 - respect for the cultural diversity of Australian society;
- provide a flexible structure within which students can prepare for:
 - further education and training
 - employment
 - full and active participation as citizens;
- provide formal assessment and certification of students' achievements;
- provide a context within which schools also have the opportunity to foster students' physical and spiritual development.

2 Rationale for Information Processes and Technology in the Stage 6 Curriculum

Information systems and the role they play in society have increased in significance in recent years. The raw ingredients — information, information technology and participants — combine to form information processes within information systems. The area of information systems has provided major jobs growth for both women and men in recent years. Moreover, fields which have not traditionally been associated with computers — but in which processing information is a vital function — are emerging as exciting new areas of employment. These include music, the arts, science and technology as well as new and fast-growing industries that use multimedia.

The, Information Processes and Technology Stage 6 course, teaches students about information-based systems. It covers the processes of collecting, organising, analysing, storing and retrieving, processing, transmitting and receiving, and displaying, as well as the technologies that support them. With this background, students will be well placed to adapt to new technologies as they emerge.

Through this course, students will gain a good working knowledge of:

- the key concepts of data, information and systems
- the interactive nature of effective information-based systems
- available and emerging information technologies
- the social and ethical issues associated with the use of information technology and information systems, such as equity and access, privacy, freedom of information and copyright
- the communication, personal and team skills necessary to ensure that an information systems solution is appropriate for the needs of the users
- related issues such as project management, documentation and user interfaces.

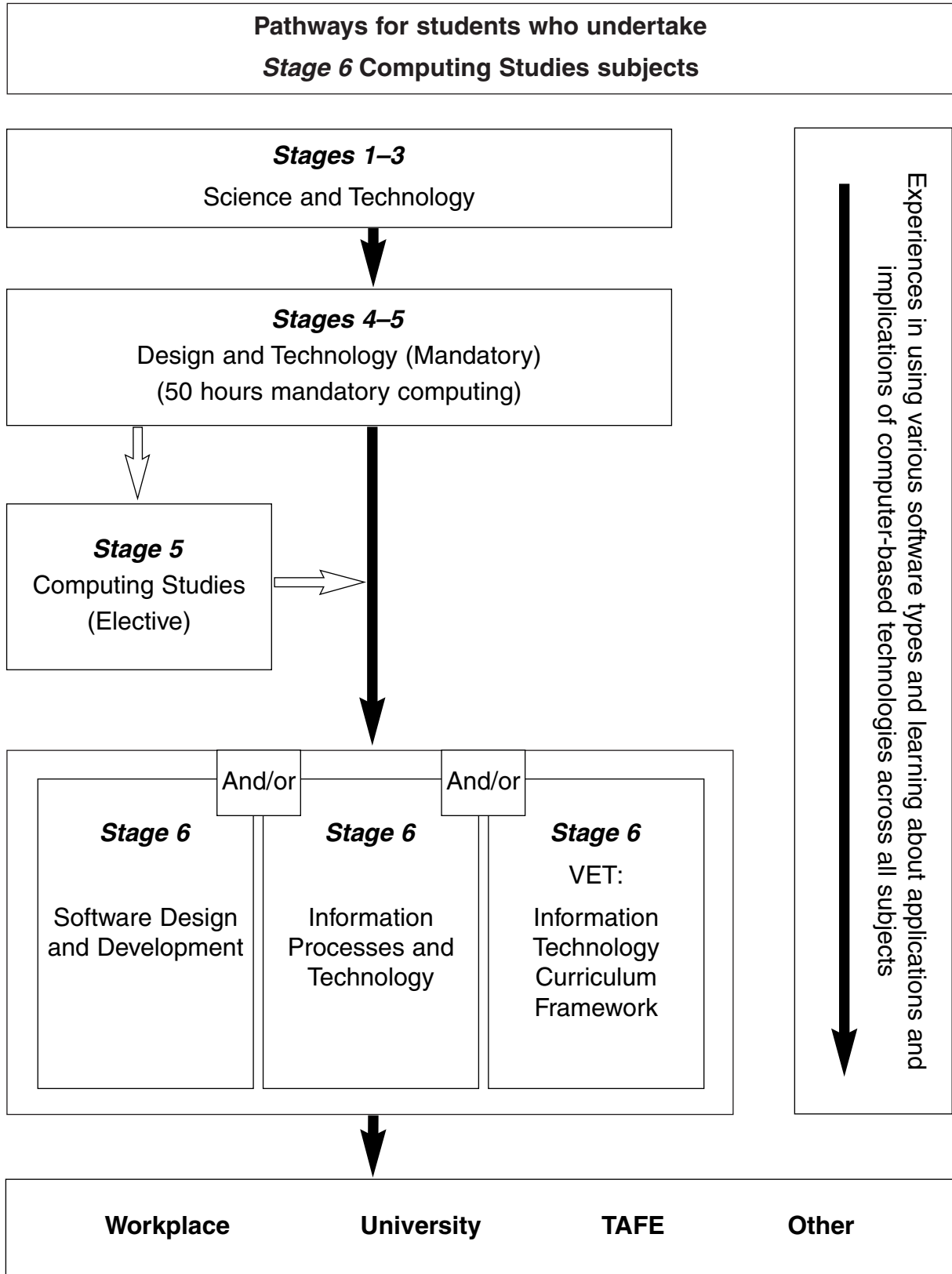
On successful completion of this course, students will be able to:

- select the most appropriate technology for a given situation
- design and implement an information-based system using a creative and methodical approach.

This course complements another Stage 6 course, Software Design and Development, which focuses on the design and development of software solutions.

Students who successfully complete Information Processes and Technology will be confident, competent and discriminating users of information processes and information technology. They will appreciate the nature of information, its ethical use and its impact on many aspects of life. As such, they will be well prepared to pursue further education and employment across an especially wide range of contexts.

3 Continuum of Learning for Information Processes and Technology Stage 6 Students



4 Aim

Information Processes and Technology Stage 6 is designed to enable students to become confident, competent, discriminating and ethical users of information technologies, to possess an understanding of information processes and to appreciate the effect of information systems on society.

5 Objectives

Students will develop:

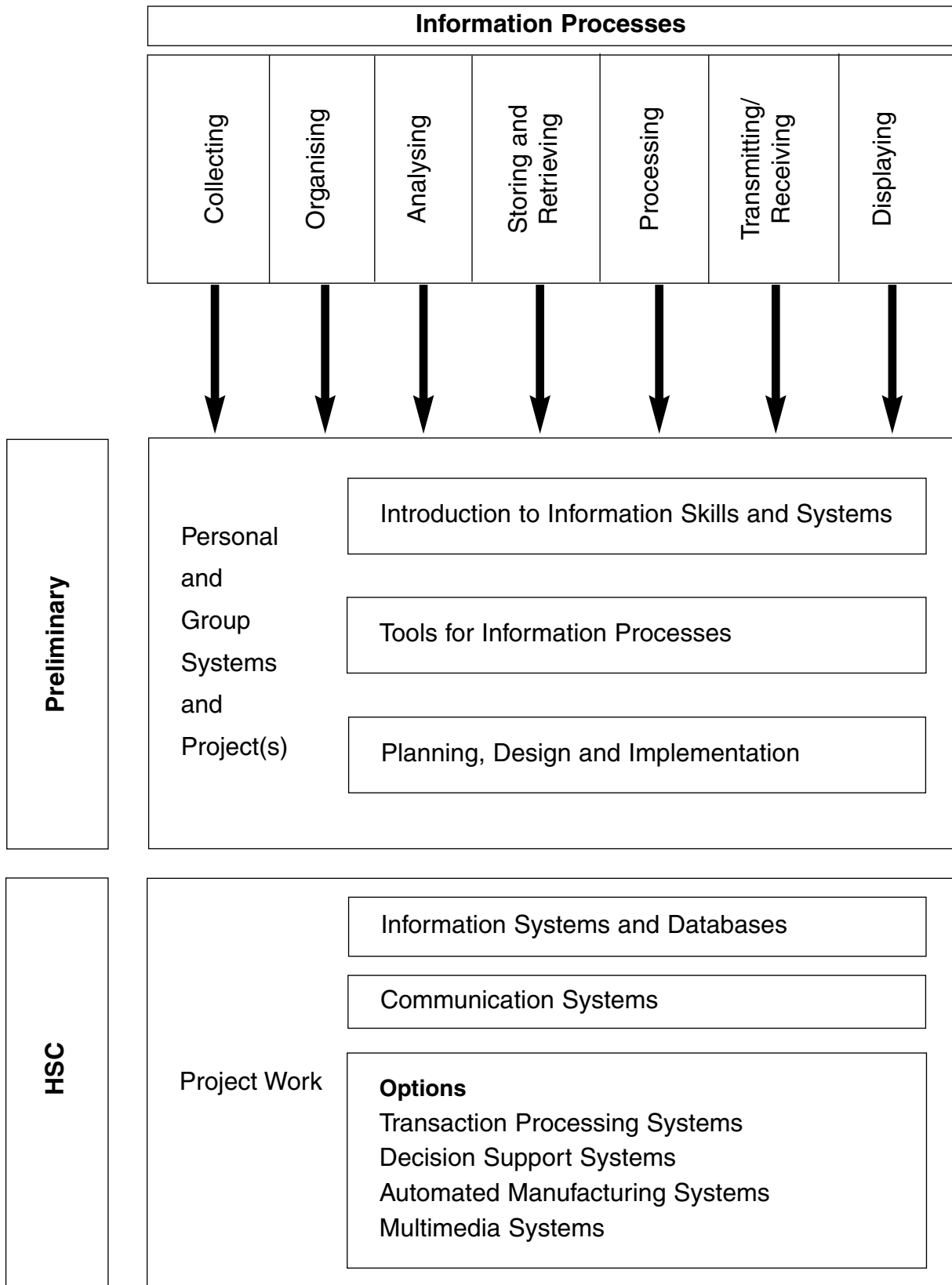
1. knowledge and understanding of the nature and function of information systems
2. knowledge and understanding of interrelationships among information processes
3. an understanding and appreciation of social and ethical issues pertaining to information systems, technologies and processes
4. an understanding and appreciation of the emerging nature of information systems, technologies and processes within a historical context
5. skills in the discriminatory selection and ethical use of appropriate resources and tools to support information systems
6. skills and techniques to creatively and methodically plan, design and implement information systems to address needs
7. skills in management, communication and teamwork in relation to individual and group activities.

6 Course Structure

The arrangement and relationship between components of the Preliminary course and the HSC course for Information Processes and Technology Stage 6 are outlined below. The percentage values refer to indicative course time.

Preliminary Course	HSC Course
<p>Introduction to Information Skills and Systems (20%)</p> <ul style="list-style-type: none"> • Information systems in context • Information processes • Digital representation of data • Classification of information systems • Social and ethical issues <p>Tools for Information Processes (40%)</p> <ul style="list-style-type: none"> • Collecting • Organising • Analysing • Storing and Retrieving • Processing • Transmitting and Receiving • Displaying <p>Planning, Design and Implementation (20%)</p> <ul style="list-style-type: none"> • Understanding the problem to be solved • Making decisions • Designing solutions • Implementing • Testing, Evaluating and Maintaining • Social and ethical issues <p>Personal and Group Systems and Projects (20%)</p> <ul style="list-style-type: none"> • Personal information systems • Group information systems 	<p>Project Work (20%)</p> <ul style="list-style-type: none"> • Understanding the problem • Making decisions • Designing solutions • Project management • Social and ethical design • Implementing • Testing, evaluating and maintaining <p>Information Systems and Databases (20%)</p> <ul style="list-style-type: none"> • Information systems • Examples of database information systems • Organisation methods • Storage and retrieval • Other information processes • Issues related to information systems <p>Communication Systems (20%)</p> <ul style="list-style-type: none"> • Characteristics of communication systems • Examples of communication systems • Transmitting and receiving in communication systems • Other information processes in communication systems • Issues related to communication systems <p style="text-align: center;">Option Strands (40%)</p> <p>Students will select TWO of the following options:</p> <ul style="list-style-type: none"> • Transaction Processing Systems • Decision Support Systems • Automated Manufacturing Systems • Multimedia Systems

Preliminary and HSC courses



7 Objectives and Outcomes

7.1 Table of Objectives and Outcomes

Objectives	Preliminary Outcomes	HSC Outcomes
Students will develop:	A student:	A student:
1. knowledge and understanding of the nature and function of information systems	<p>P1.1 describes the nature of information processes and information technology</p> <p>P1.2 classifies the functions and operations of information processes and information technology</p>	<p>H1.1 applies an understanding of the nature and function of information technologies to a specific practical situation</p> <p>H1.2 explains and justifies the way in which information systems relate to information processes in a specific context</p>
2. knowledge and understanding of interrelationships among information processes	<p>P2.1 identifies the information processes within an information system</p> <p>P2.2 recognises the interdependence between each of the information processes</p>	<p>H2.1 analyses and describes a system in terms of the information processes involved</p> <p>H2.2 develops solutions for an identified need which address all of the information processes</p>
3. an understanding and appreciation of social and ethical issues pertaining to information systems, technologies and processes	P3.1 identifies social and ethical issues	<p>H3.1 evaluates the effect of information systems on the individual, society and the environment</p> <p>H3.2 demonstrates ethical practice in the use of information systems, technologies and processes</p>

<p>4. an understanding and appreciation of the emerging nature of information systems, technologies and processes within a historical context</p>	<p>P4.1 describes the historical development of information systems and relates these to current and emerging technologies</p>	<p>H4.1 proposes ways in which information systems will meet emerging needs</p>
<p>5. skills in the discriminatory selection and ethical use of appropriate resources and tools to support information systems</p>	<p>P5.1 selects and ethically uses computer based and non-computer based resources and tools to process information</p>	<p>H5.1 justifies the selection and use of appropriate resources and tools to effectively develop and manage projects</p> <p>H5.2 assesses the ethical implications of selecting and using specific resources and tools</p>
<p>6. skills and techniques to creatively and methodically plan, design and implement information systems to address needs</p>	<p>P6.1 analyses and describes an identified need</p> <p>P6.2 generates ideas, considers alternatives and develops solutions for a defined need</p>	<p>H6.1 analyses situations, identifies a need and develops solutions</p> <p>H6.2 selects and applies a methodical approach to planning, designing or implementing a solution</p>
<p>7. skills in management, communication and teamwork in relation to individual and group activities</p>	<p>P7.1 recognises and applies management and communication techniques to project work</p> <p>P7.2 uses technology to support group work</p>	<p>H7.1 implements effective management techniques</p> <p>H7.2 uses methods to thoroughly document the development of individual and/or group projects</p>

7.2 Key Competencies

Information Processes and Technology Stage 6 provides a context within which to develop general competencies considered essential for the acquisition of effective, higher-order thinking skills necessary for further education, work and everyday life.

Key competencies are embedded in the *Information Processes and Technology Stage 6 Syllabus* to enhance student learning. The key competencies of

- ***collecting, analysing and organising information***
- ***communicating ideas and information***
- ***using technology***

reflect core processes of information systems inquiry and are explicit in the objectives and outcomes of the syllabus.

The other key competencies are developed through the methodologies of the syllabus and through classroom pedagogy. Students work as individuals and as members of groups in both Preliminary and HSC projects, to conduct investigations on information systems, and through this, the key competencies of

- ***planning and organising activities***
- ***working with others and in teams***

are developed. When students construct Gantt charts or analyse statistical evidence, they are developing the key competency

- ***using mathematical ideas and techniques.***

Finally, the exploration of issues and investigation of the nature of problems associated with information systems contributes towards the students' development of the key competency of

- ***solving problems.***

8 Content: Information Processes and Technology Preliminary Course

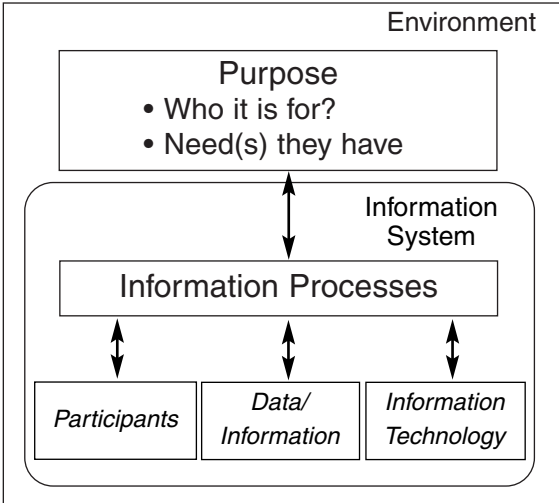
8.1 Introduction to Information Skills and Systems

An information system has a purpose in that it addresses the need(s) of a group or an individual. It performs the information processes of collecting, organising, analysing, storing/retrieving, processing, transmitting/receiving and displaying. Information processes involve computer and non-computer activities. For the processes to occur, participants (people), data/information and information technologies (hardware and software) are required. The purpose for an information system defines who it is for and what they need. Information systems give rise to ethical issues for people directly and indirectly involved with them. They have a social impact on the environment in which they operate.

Outcomes

A student:

- P1.1 describes the nature of information processes and information technology
- P1.2 classifies the functions and operations of information processes and information technology
- P2.1 identifies the information processes within an information system
- P2.2 recognises the interdependence between each of the information processes
- P3.1 identifies social and ethical issues
- P4.1 describes the historical developments of information systems and relates these to current and emerging technologies.

Students learn about:	Students learn to:
<p>information systems in context</p> <ul style="list-style-type: none"> • diagrammatic representation of an information system in context 	<ul style="list-style-type: none"> • diagrammatically represent a given scenario that involves an information system

Students learn about:	Students learn to:
<ul style="list-style-type: none"> • the environment as everything that influences, and is influenced by, the information system and its purpose • the purpose as who the information system is for and the need they have • who the information system is for including: <ul style="list-style-type: none"> – individuals – organisations (individuals with a common goal, eg business, government agency or charity) • the information system as a set of information processes requiring participants, data/information and information technology to take place • information processes involving computer and non-computer activities • information technology as hardware and software used in information processes • data/information as raw material that information processes deal with • participants as the people who carry out the information processes within the information system <p>information processes</p> <ul style="list-style-type: none"> • collecting, as the process that: <ul style="list-style-type: none"> – defines the required data – identifies the source for the data – determines how the data will be gathered – gathers the data • organising as the process that: <ul style="list-style-type: none"> – determines the format in which data will be represented in the information system • analysing as the process that: <ul style="list-style-type: none"> – interprets the data, transforming it into information • storing and retrieving as the process that: <ul style="list-style-type: none"> – saves data and information for later use – obtains data and information previously saved • processing as the process that: <ul style="list-style-type: none"> – manipulates data and information 	<ul style="list-style-type: none"> • explain how an information system impacts on its environment and how it in turn impacts on the information system • describe the environment and purpose of an information system for a given context • explain how a given need can be supported by an information system • describe an information system in terms of its purpose • for a given scenario, identify the people who are: <ul style="list-style-type: none"> – in the environment – users of the information system – participants in the information system <ul style="list-style-type: none"> • distinguish between, and categorise, the activities within an information system in terms of the seven information processes • use an existing information system to meet a simple need • manually step through a given information system identifying the information process • for a given information system, describe how <ul style="list-style-type: none"> – participants – data/information – information technology relate to the information processes • schematically represent the flow of data and information through a given information system, identifying the information processes

Students learn about:	Students learn to:
<p>social and ethical issues</p> <ul style="list-style-type: none"> • social and ethical issues arising from the processing of information, including: <ul style="list-style-type: none"> – privacy of the individual – security of data and information – accuracy of data and information – changing nature of work – appropriate information use – health and safety – copyright laws • the people affected by social and ethical issues, including: <ul style="list-style-type: none"> – participants within the information system – those with the purpose – those in the environment • the responsibility of system designers to create information systems that are socially and ethically acceptable • current government legislation to protect the individual • the use of information systems in fields such as manufacturing as well as the traditional fields of observation and recording • global information systems: <ul style="list-style-type: none"> – where the purpose involves international organisations, or – where one of the participants, data/information or information technology is international 	<ul style="list-style-type: none"> • describe social and ethical issues that relate to: <ul style="list-style-type: none"> – information system users – participants • ensure that relevant social and ethical issues are addressed • identify and explain reasons for the expansion of information systems, including: <ul style="list-style-type: none"> – advances in technology – suitability of information technology for repetitive tasks

8.2 Tools for Information Processes

In order to understand and build information systems, information processes must be understood. This topic examines each of the information processes by focusing on some of the tools used to carry them out. The tools include information technology and non-computer procedures. In this topic, tools are categorised and presented according to a particular information process. In reality, however, one tool may overlap several processes. One tool can not operate in isolation; therefore, demonstrations of particular tools will involve additional tools and processes. Information processes and tools affect participants within the information system and people beyond it, giving rise to social and ethical issues. Additional tools for specific types of information systems will be examined in the HSC course.

Outcomes

A student:

- P1.1 describes the nature of information processes and information technology
- P1.2 classifies the functions and operations of information processes and information technology
- P2.1 identifies the information processes within an information system
- P2.2 recognises the interdependence between each of the information processes
- P3.1 identifies social and ethical issues
- P4.1 describes the historical developments of information systems and relates these to current and emerging technologies
- P5.1 selects and ethically uses computer based and non-computer based resources and tools to process information
- P6.1 analyses and describes an identified need
- P6.2 generates ideas, considers alternatives and develops solutions for a defined need
- P7.1 recognises and applies management and communication techniques to project work
- P7.2 uses technology to support group work.

Students learn about:	Students learn to:
<p>collecting</p> <ul style="list-style-type: none"> • collecting as the information input process, that involves: <ul style="list-style-type: none"> – deciding what to collect – locating it – collecting it • hardware used for collection, including: <ul style="list-style-type: none"> – scanners and/or digital cameras to collect images – microphones and/or recording from peripheral devices to collect audio – video and/or peripheral devices with appropriate interfaces to capture video – keyboards and/or optical character readers to collect numbers and text – data capture devices such as counters for counting cars on a road – historical and emerging trends in hardware collection devices • software used for collection, including: <ul style="list-style-type: none"> – software to interface with hardware collection devices – data entry into application software – the Internet as a collection source • non-computer procedures in collecting <ul style="list-style-type: none"> – literature searches – surveys and interviews – form design for data collection – manual recording of events – existing non-computer data • social and ethical issues in collecting <ul style="list-style-type: none"> – bias in the choice of what and where to collect data – accuracy of the collected data – copyright and acknowledgment of source data when collecting – the rights to privacy of individuals on whom data is collected – ergonomic issues for participants entering large volumes of data into an information system 	<ul style="list-style-type: none"> • for a given scenario, identify alternatives for data collection and choose the most appropriate one • use a range of hardware collection devices to collect different data types • describe the operation of a range of hardware collection devices • make predictions about new and emerging trends in data collection based on past practices <ul style="list-style-type: none"> • choose the most appropriate combination of hardware, software and/or non-computer tools to collect data from a given source • use the Internet to locate data for a given scenario • design forms that allow data to be accurately recorded and easily input into software applications • select and use appropriate communication skills to conduct interviews and surveys so that data can be accurately collected • identify existing data that can be collected for an information system for a given scenario • recognise personal bias and explain its impact on data collection • identify the privacy implications of particular situations and propose strategies to ensure they are respected • predict errors that might flow from data inaccurately collected • predict issues when collecting data that might arise when it is subsequently analysed and processed

Students learn about:	Students learn to:
<p>organising</p> <ul style="list-style-type: none"> • the process of organising as the arranging, representing and formatting of data for use by other information processes • how different methods of organising affect processing, for example: <ul style="list-style-type: none"> – letters of the alphabet represented as images rather than text – numbers represented as text rather than numeric • the way in which hardware used for collection organises data by digitising image, audio, video, numeric and text data • software for organisation, including: <ul style="list-style-type: none"> – paint and draw software for images – mixing software for audio – animation software for video – word processors and desk top publishing for text – spreadsheets for numeric – software that organises data into tables, hypertext and hypermedia – software that converts data from one format to another • non-computer tools for organising <ul style="list-style-type: none"> – hard copy systems such as phone books, card catalogues and pen and paper forms – pen and paper methods for organising data • social and ethical issues associated with organising, including: <ul style="list-style-type: none"> – current trends in organising data, such as: <ul style="list-style-type: none"> - the increase in hypermedia as a result of the world wide web - the ability of software to access different types of data - a greater variety of ways to organise resulting from advances in display technology – the cost of poorly organised data, such as redundant data in a database used for mail-outs – the appropriateness of a two digit date field at a time when storage and processing was more expensive, versus the current inappropriateness 	<ul style="list-style-type: none"> • choose the most appropriate format for a given set of data and identify and describe the most appropriate software and method to organise it • describe how different types of data are digitised by the hardware that collects it • compare and contrast different methods of organising the same set of data using existing software applications • use software to combine data organised in different formats • use data dictionaries to describe the organisation of data within a given system • assess future implications when making decisions about the way data is organised

Students learn about:	Students learn to:
<p>analysing</p> <ul style="list-style-type: none"> • analysing as the process that transforms data into information • hardware requirements for analysing, including: <ul style="list-style-type: none"> – large amounts of primary and secondary storage allowing for fast processing – fast processes allowing many calculations rapidly • software features for analysis, including: <ul style="list-style-type: none"> – searching/selecting data – sorting – modelling/simulations – what-if scenarios – charts and graphs to identify trends – file comparison • non-computer tools, for analysing, including: <ul style="list-style-type: none"> – searching manual filing systems – non-computer models and simulations with these • social and ethical issues associated with analysis, including: <ul style="list-style-type: none"> – unauthorised analysis of data – data incorrectly analysed – erosion of privacy from linking databases for analysis <p>storing and retrieving</p> <ul style="list-style-type: none"> • storing and retrieving as the two step process that saves data/information and reloads it to allow for: <ul style="list-style-type: none"> – other processing to take place – a temporary halt in the system – backup and recovery – the transfer of data/information • hardware in storing and retrieving <ul style="list-style-type: none"> – hardware devices, including: <ul style="list-style-type: none"> - magnetic disk - optical disk - network storage - flash memory - magnetic tape – the characteristics of hardware, including: <ul style="list-style-type: none"> - random or sequential access - volatile or non-volatile - permanent or non-permanent – the trend to faster and greater storage capacity over time 	<ul style="list-style-type: none"> • identify hardware requirements to carry out a particular type of analysis • describe the best organisation for data for a particular type of analysis • use software analysis features in a range of software applications to analyse image, audio, video, text and numeric data • compare and contrast computer and non-computer tools for analysis on the basis of speed, volume of data that can be analysed, and cost • analyse data on individuals for the purpose it was collected <ul style="list-style-type: none"> • document the storage and retrieval process in an information system • describe the characteristics and operation of hardware devices used for storage and retrieval • use a range of hardware devices and associated software to store and retrieve information and data • store and retrieve data using a network

Students learn about:	Students learn to:
<ul style="list-style-type: none"> • non-computer tools for transmitting and receiving, such as mail, phone, fax and radio and television (transmit only) • social and ethical issues associated with transmitting and receiving <ul style="list-style-type: none"> – accuracy of data received from the Internet – security of data being transferred – net-etiquette – acknowledgment of data source – global network issues, time zones, date fields, exchange rates – changing nature of work for participants, such as work from home and telecommuting – current developments and future trends in digital communications, radio and television – the impact of the Internet on traditional business <p>displaying</p> <ul style="list-style-type: none"> • displaying as the output from the information system to meet a purpose • hardware for displaying, including: <ul style="list-style-type: none"> – screens for text, numeric, image and video – printers for text, numeric, image and video – speakers and speech synthesis for audio – plotter and slides for image – digital and analogue for video • software for display <ul style="list-style-type: none"> – interfaces for hardware display devices – display features in applications packages, including: <ul style="list-style-type: none"> - reporting - formatting - spacing - merging - tables - charts • non-computer tools: • story boarding • pen and paper designs • traditional methods for displaying the different types of data 	<ul style="list-style-type: none"> • demonstrate sending and receiving mail, with attachments, over an e-mail system • encode information or data for transmitting and decode information and data received • select the most appropriate combination of hardware and software for a given situation to allow computers to transmit and receive data or information • compare and contrast computer and non-computer based communication systems • describe and employ net-etiquette when using the Internet • predict and discuss possible future trends in communications and the impact they are likely to have on the transmitting and receiving of data/information <ul style="list-style-type: none"> • choose and justify the most appropriate method for displaying information given a particular set of circumstances • describe the operation of display hardware • use a range of hardware and software combinations to display different types of information • format a text document with appropriate use of fonts, spacing and layout for printed and screen displays • design and develop a simple web page • generate reports for display within a database • mail-merge information from a database into another application for display • create audio, image and video displays with presentation software • compare and contrast displays created without a computer to those created with a computer • identify, discuss and appreciate the widespread use of non-computer methods of displaying information

Students learn about:	Students learn to:
<ul style="list-style-type: none">• social and ethical issues associated with displays<ul style="list-style-type: none">– communication skills of those presenting displays– past, present and emerging trends in displays– appropriate displays for a wide range of audiences, including:<ul style="list-style-type: none">- standards for display for the visually impaired- displays suitable for young children	<ul style="list-style-type: none">• design a display for a wide variety of users

8.3 Planning, Design and Implementation

New information systems are created when old systems do not adequately meet the need of users of the information system, or when a need exists that could be met by an information system. The success of a new system depends upon how well the problem is understood, how the system is designed, how it is tested, evaluated and maintained over time. This topic introduces students to the traditional method for developing systems. Alternatives to this model are presented in the HSC course.

Outcomes

A student:

- P1.1 describes the nature of information processes and information technology
- P1.2 classifies the functions and operations of information processes and information technology
- P2.1 identifies the information processes within an information system
- P2.2 recognises the interdependence between each of the information processes
- P3.1 identifies social and ethical issues
- P4.1 describes the historical developments of information systems and relates these to current and emerging technologies
- P5.1 selects and ethically uses computer based and non-computer based resources and tools to process information
- P6.1 analyses and describes an identified need
- P6.2 generates ideas, considers alternatives and develops solutions for a defined need.

Students learn about:	Students learn to:
<p>understanding the problem to be solved</p> <ul style="list-style-type: none"> • understanding the purpose • approaches to identify problems with existing systems, including: <ul style="list-style-type: none"> – interview/survey users of the information system – interview/survey participants – analysing the existing system by determining: <ul style="list-style-type: none"> - how it works - what it does - who uses it • user requirement reports • project plans incorporating project management tools including: <ul style="list-style-type: none"> – Gantt charts – scheduling of tasks – journal and diaries – funding management plan – communication management plan <p>making decisions</p> <ul style="list-style-type: none"> • estimating the cost of proposed solutions • determining if the required technology exists • determining the time frame by which the new system must be operational • selecting the most appropriate option • identifying concerns of participants, users of the information system and people in the environment <p>designing solutions</p> <ul style="list-style-type: none"> • identify participants, data/information to be used, information technology and how the information processes will operate • ways to ensure participants' concerns are addressed and the system design is human centred • clarifying with users the benefits of the new information system • designing the information technology so that it is easy to maintain in the future 	<ul style="list-style-type: none"> • select and apply surveys and interviews, with the support of information technology, in order to understand the problem to be solved • diagrammatically represent existing systems using context diagrams, data flow diagrams and systems flow charts • define the requirements for a new system in terms of: <ul style="list-style-type: none"> – the needs of the users of the information system – who the participants are – the data/information to be used – required information technology – information processes • produce a report stating the need, and how an information system will meet it <ul style="list-style-type: none"> • create Gantt charts to show the implementation time frame • investigate/research new information technologies that could form part of the system • consider and justify the feasibility of a solution based on <ul style="list-style-type: none"> – cost – technical feasibility – available time for implementation – its alignment with the current goals of those the system is for <ul style="list-style-type: none"> • represent the new system diagrammatically • document the relationship between the new system, user of the information system and their need(s) • analyse and customise user interfaces and other tasks in applications software forming part of the solution

Students learn about:	Students learn to:
<p>implementing</p> <ul style="list-style-type: none"> • methods of implementing new solutions, including: <ul style="list-style-type: none"> – parallel conversion – direct conversion – phased conversion – pilot conversion • implementing training for the participants in the system <p>testing, evaluating and maintaining</p> <ul style="list-style-type: none"> • testing the new system to see that it meets initial requirements • reviewing the effect on users of the information system, participants and people within the environment • modifying parts of the system where problems are identified <p>social and ethical issues</p> <ul style="list-style-type: none"> • machine-centred systems simplify what computers do at the expense of participants • human-centred systems as those that make participants' work as effective and satisfying as possible • how the relationships between participants change as a result of the new system • ensuring the new system provides participants with a safe work environment • awareness of the impact the system may have on the participants: <ul style="list-style-type: none"> – opportunities to use their skills – meaningful work – need for change – opportunities for involvement and commitment 	<ul style="list-style-type: none"> • compare and contrast conversion methods • justify the selected conversion method for a given situation • convert from the old system to the new • implement the appropriate information technology • demonstrate participant training of the new system • identify the training needs of users of the information system <ul style="list-style-type: none"> • evaluate information processes in relation to adequate performance and design and implement modifications • compare the new system to the requirement report <ul style="list-style-type: none"> • design human-centred information systems • identify human-centred and machine-centred information systems and describe the impact each has on its participants • develop systems that pay as much attention to the needs of participants as they do to information technology

8.4 Personal and Group Systems and Projects

A personal information system is one where there is only one participant. Its purpose is to meet the needs of that individual. The information technology used is most likely to be a personal computer with appropriate software. In group information systems, the participants are a small group working together to meet a need. The group is supported by technology, and the personal computers of group members are often connected to form a network. In this course, project work involves the planning, design and implementation of information systems as outlined in the topic Planning, Design and Implementation. Two projects are to be completed: a personal and a group information system. Students may begin their project work at any time during the Preliminary course.

Outcomes

A student:

- P1.1 describes the nature of information processes and information technology
- P1.2 classifies the functions and operations of information processes and information technology
- P2.1 identifies the information processes within an information system
- P2.2 recognises the interdependence between each of the information processes
- P3.1 identifies social and ethical issues
- P5.1 selects and ethically uses computer based and non computer-based resources and tools to process information
- P6.1 analyses and describes an identified need
- P6.2 generates ideas, considers alternatives and develops solutions for a defined need
- P7.1 recognises and applies management and communication techniques to project work
- P7.2 uses technology to support group work.

Students learn about:	Students learn to:
<p>personal information systems</p> <ul style="list-style-type: none"> • personal information systems as those where the participant is an individual • examples of personal information systems, such as: <ul style="list-style-type: none"> – a scriptwriter using a word processor to produce an episode of a television program – a farmer using a spreadsheet to record income and expenditure figures and make what-if predictions from them – a database of patient records kept by a doctor <p>group information systems</p> <ul style="list-style-type: none"> • group information systems as being those where participants work in groups using data/information and information technology to conduct information processes so that a need of the information system can be met • the characteristics of the group, including: <ul style="list-style-type: none"> – members working together, often via a computer network – the different roles played by individuals in the group, such as the leader, spokesperson – areas of strength and weakness of individual group members – skills of members, including: <ul style="list-style-type: none"> - communication - interpersonal - technical - organisational 	<ul style="list-style-type: none"> • develop a personal information system, such as one that manages subject material received during a course, by organising, storing/retrieving and analysing using a word processor and a database • apply the phases presented in the topic Planning, Design and Implementation, namely: <ul style="list-style-type: none"> – understanding the problem, – making decisions, – designing solutions, – implementing, – testing, evaluating and maintaining, • for the chosen need, determine the data/information, information technology and the information processes • apply project management tools to the development of the system • document the phases in the topic Planning, Design and Implementation as they relate to their project • represent the system diagrammatically <ul style="list-style-type: none"> • develop a group information system to perform a task such as: <ul style="list-style-type: none"> – the production of a school or class magazine – a video presentation – a booking system for a school resource • apply the phases presented in the topic Planning, Design and Implementation, namely: <ul style="list-style-type: none"> – understanding the problem, – making decisions, – designing solutions, – implementing, – testing, evaluating and maintaining, • determine the information technology, data/information and the role of participants (group members) in conducting the information processes for the system

Students learn about:	Students learn to:
<ul style="list-style-type: none">• the consequences for groups that fail to function as a team, including:<ul style="list-style-type: none">– financial loss– employment loss– missed opportunities• examples of group information systems, such as:<ul style="list-style-type: none">– joint authors of a single document– the production of a website to promote the local community– the organisation of a computer game activity on a network• how information technology supports group work	<ul style="list-style-type: none">• apply project management tools to the development of the system within the group• produce a group report that:<ul style="list-style-type: none">– documents all phases in the development of the system– represents the system diagrammatically

9 Content: Information Processes and Technology HSC Course

9.1 Project Work

Project work in the HSC course is intended to give students an opportunity to plan, design and implement an information system that has a purpose. The chosen information system should be either:

- a database information system
- a communication system
- a transaction processing system
- a decision support system
- an automated manufacturing system, or
- a multimedia system.

The construction of the information system will follow the stages detailed in the Preliminary topic Planning, Design and Implementation. However, the content has been expanded beyond the traditional method to include prototyping and participant developed solutions. One large project or a number of smaller projects may be undertaken in the course. If smaller projects are undertaken, they need to occur over a significant amount of time and involve sustained work. Project(s) should allow students to see the information system in its full context. Students should identify the purpose for the information system, the participants, data/information and information technology that work with the information processes. An indicative 20% course time has been set aside for project(s) in the HSC course. Project(s) may be undertaken by groups of students or individuals and can be commenced at anytime during the HSC course.

Outcomes

A student:

- | | |
|------|---|
| H1.1 | applies an understanding of the nature and function of information technologies to a specific practical situation |
| H1.2 | explains and justifies the way in which information systems relate to information processes in a specific context |
| H2.1 | analyses and describes a system in terms of the information processes involved |
| H2.2 | develops solutions for an identified need which address all of the information processes |
| H3.1 | evaluates the effect of information systems on the individual, society and the environment |
| H3.2 | demonstrates ethical practice in the use of information systems, technologies and processes |
| H4.1 | proposes ways in which information systems will meet emerging needs |
| H5.1 | justifies the selection and use of appropriate resources and tools to effectively develop and manage projects |
| H5.2 | assess the ethical implications of selecting and using specific resources and tools |

- H6.1 analyses situations, identifies a need and develops solutions
- H6.2 selects and applies a methodical approach to planning, designing or implementing a solution
- H7.1 implements effective management techniques
- H7.2 uses methods to thoroughly document the development of individual and/or group projects.

Students learn about:	Students learn to:
<p>project management</p> <ul style="list-style-type: none"> • developing a project plan • communication skills necessary for dealing with others <p>social and ethical design</p> <ul style="list-style-type: none"> • identifying social and ethical issues <p>understanding the problem</p> <ul style="list-style-type: none"> • prototypes, a working model of an information system, built in order to understand the requirements of the system <ul style="list-style-type: none"> – used when the problem is not easily understood – repetitive process of prototype modification and participants' feedback until the problem is understood – can be the basis for further system development <p>making decisions</p> <ul style="list-style-type: none"> • feasibility studies of proposed solutions and the judging criteria: <ul style="list-style-type: none"> – is it economically feasible? – is it technically feasible? – does it fit the objectives of the owners of the information system? – can it be implemented in the available time frame? – are there participants who can operate it? 	<ul style="list-style-type: none"> • develop and apply a project management plan that incorporates communication strategies with participants in the process such as <ul style="list-style-type: none"> – active listening – conflict resolution – negotiation skills – interview techniques – team building • assess the social and ethical implications of the solution throughout the project • apply the steps in understanding the problem • identify, communicate with and involve participants of the current system • create a prototype from applications packages that provide: <ul style="list-style-type: none"> – screen generators – report generators • use a prototype to clarify participants' understanding of the problem • conduct a feasibility study to determine if a proposed solution is feasible • report on the benefits, costs and risks of projects that are to proceed

9.2 Information Systems and Databases

Information systems are computer systems that support end users, giving them access to the information. For a large number of information systems, the data is held in databases and access is via database management systems. Information systems perform a variety of tasks and these are considered in the following topics in the HSC course. While all of the information processes are represented in information systems, the emphasis in this topic is on the processes of organising, storing and retrieving with database systems and hypermedia.

Outcomes

A student:

- H1.1 applies an understanding of the nature and function of information technologies to a specific practical situation
- H1.2 explains and justifies the way in which information systems relate to information processes in a specific context
- H2.1 analyses and describes a system in terms of the information processes involved
- H2.2 develops solutions for an identified need which address all of the information processes
- H3.1 evaluates the effect of information systems on the individual, society and the environment
- H3.2 demonstrates ethical practice in the use of information systems, technologies and processes
- H4.1 proposes ways in which information systems will meet emerging needs
- H5.2 assess the ethical implications of selecting and using specific resources and tools.

Students learn about:	Students learn to:
<p>information systems</p> <ul style="list-style-type: none"> • the characteristics of an information system, namely: <ul style="list-style-type: none"> – the organisation of data into information – the analysing of information to give knowledge • the different types of and purposes for information systems, including systems used to: <ul style="list-style-type: none"> – process transactions – provide users with information about an organisation – help decision-making – manage information used within an organisation 	<ul style="list-style-type: none"> • identify the type and purpose of a given information system • represent an information system using a systems representation tool <ul style="list-style-type: none"> – identify the purpose, information processes, information technology and participants within a given system – represent diagrammatically the flow of information within an information system

Students learn about:	Students learn to:
<p>examples of database information systems</p> <ul style="list-style-type: none"> • school databases holding information on teachers, subjects, classrooms and students • the Roads and Traffic Authority holding information on automobiles and holders of drivers licences • video stores holding information on borrowers and videos <p>organisation methods</p> <ul style="list-style-type: none"> • non-computer methods of organising including: <ul style="list-style-type: none"> – telephone books – card based applications • computer based methods of organising, including: <ul style="list-style-type: none"> – flat-file systems – database management systems – hypermedia • the advantages and disadvantages of computer based and non-computer based organisation methods • the logical organisation of flat-file databases, including: <ul style="list-style-type: none"> – files – records – fields, key fields – characters • the logical organisation of relational databases, including: <ul style="list-style-type: none"> – schemas as consisting of: <ul style="list-style-type: none"> - entities - attributes - relationships – tables as the implementation of entities consisting of: <ul style="list-style-type: none"> - attributes - records – views of the data for different purposes 	<ul style="list-style-type: none"> • identify participants, data/information and information technology for the given examples of database information systems • describe the relationships between participants, data/information and information technology for the given examples of database information systems <ul style="list-style-type: none"> • choose between a computer based or non-computer based method to organise data, given a particular set of circumstances • identify situations where one type of database is more appropriate than another • represent an existing relational database in a schematic diagram • create a schematic diagram for a scenario where the data is to be organised into a relational database • modify an existing schema to meet a change in user requirements • choose and justify the most appropriate type of database, flat-file or relational, to organise a given set of data • create a simple relational database from a schematic diagram and data dictionary • populate a relational database with data • describe the similarities and differences between flat-file and relational databases

Students learn about:	Students learn to:
<ul style="list-style-type: none"> • data modelling tools for organising databases, including: <ul style="list-style-type: none"> – data dictionaries to describe the characteristics of data including: <ul style="list-style-type: none"> - size - type - purpose – schematic diagrams that show the relationships between entities – normalising data to reduce data redundancy • the logical organisation of hypertext/hypermedia, including: <ul style="list-style-type: none"> – nodes and links – uniform resource locators – metadata (data about data), such as HTML tags • tools for organising hypermedia, including: <ul style="list-style-type: none"> – story boards to represent data organised using hyperlinks – software that allows text, graphics and sounds to be hyper linked <p>storage and retrieval</p> <ul style="list-style-type: none"> • database management systems, including: <ul style="list-style-type: none"> – the role of a DBMS in handling access to a database – the independence of data from the dbms • direct and sequential access of data • on-line and off-line storage • distributed databases • storage media including: <ul style="list-style-type: none"> – hard discs – CD-ROMS – cartridge and tape • encryption and decryption • backup and security procedures • tools for database storage and retrieval, including: <ul style="list-style-type: none"> – extracting relevant information through searching and sorting a database – selecting data from a relational database using SQL commands, 	<ul style="list-style-type: none"> • create a data dictionary for a given set of data • create documentation, including data modelling, to indicate how a relational database has been used to organise data • demonstrate an awareness of issues of privacy, security and accuracy in handling data • compare and contrast hypermedia and databases for organising data • design and develop a storyboard to represent a set of data items and links between them • construct a hypertext document from a storyboard • use software that links data, such as: <ul style="list-style-type: none"> – HTML editors – web page creation software a hypertext package <ul style="list-style-type: none"> • search a database using relational and logical operators • sort a database into a specified order • generate reports from a database • calculate the storage requirements for a given number of records (given a data dictionary for a database) • construct an SQL query to select data from a given database, matching given criteria • use search engines to locate data on the World Wide Web • describe the principles of the operation of a search engine • design and create screens for interacting with selected parts of a database and justify their appropriateness

9.3 Communication Systems

When participants within the information system have a need to transmit and receive data or information, the type of system required is a communication system. Communication systems support people who are working together, by enabling the exchange of data and information electronically. In this topic, the information processes of transmitting and receiving are featured, with the other processes considered when relevant because all information processes play a role in communication systems.

Outcomes

A student:

- H1.1 applies an understanding of the nature and function of information technologies to a specific practical situation
- H1.2 explains and justifies the way in which information systems relate to information processes in a specific context
- H2.1 analyses and describes a system in terms of the information processes involved
- H2.2 develops solutions for an identified need which address all of the information processes
- H3.1 evaluates the effect of information systems on the individual, society and the environment
- H3.2 demonstrates ethical practice in the use of information systems, technologies and processes
- H4.1 proposes ways in which information systems will meet emerging needs
- H5.2 assess the ethical implications of selecting and using specific resources and tools.

Students learn about:	Students learn to:
<p>characteristics of communication systems</p> <ul style="list-style-type: none"> • communication systems as those that enable user(s) to send and receive data and information • the necessity for protocols in communication • handshaking and its importance in a communications link • the measurements of speed in a communications link • methods to check for errors in communications links, including: <ul style="list-style-type: none"> – parity bit check – check sum – cycle redundancy check 	<ul style="list-style-type: none"> • identify, describe and apply a specified communication protocol • establish a communications link and describe the steps that take place in its establishment • distinguish between bits per second and baud rate and calculate transfer rates for each • describe the operation of and apply the listed error checking methods

Students learn about:	Students learn to:
<ul style="list-style-type: none"> • network hardware, including: <ul style="list-style-type: none"> – current cable standards – servers, including: <ul style="list-style-type: none"> - file servers - print servers - mail/web servers – routers – switches – hubs – transmission media, including <ul style="list-style-type: none"> - wire transmission: twisted pair, coaxial cable and fibre optic cable - wireless transmission: microwave, satellite, wireless networks, mobile phones • network software: <ul style="list-style-type: none"> – characteristics of network operating software – network administration tasks, such as: <ul style="list-style-type: none"> - adding/removing users - assigning users to printers - giving users file access rights - installation of software and sharing with users - client installation and protocol assignment – logon and logoff procedures – network based applications • the difference between the Internet and intranets <p>other information processes in communication systems</p> <ul style="list-style-type: none"> • collecting: <ul style="list-style-type: none"> – the phone as the collection device with voice mail – EFTPOS terminal as a collection device for electronic banking 	<ul style="list-style-type: none"> • document a network, including: <ul style="list-style-type: none"> – diagrammatically represent the topology – describe the location and function of hardware components on the network – detail the network management software and the network software at the client – detail the applications that are supported by the network • for a given scenario, choose and justify the most appropriate transmission media • describe the role of the network administrator and conduct network administration tasks • demonstrate logon and logoff procedures, and justify their use • compare and contrast the Internet and intranets • using available technology, link together three or more computers <ul style="list-style-type: none"> • distinguish between original data in analog and digital form • adopt procedures to manage electronic mail • encode and decode analog and digital data and describe the techniques used • identify client processing and server processing on a network and describe its advantages and disadvantages

Students learn about:	Students learn to:
<ul style="list-style-type: none"> • processing: <ul style="list-style-type: none"> – the sending of attachments with e-mail – encoding and decoding methods, including: <ul style="list-style-type: none"> - analog data to analog signal - digital data to analog signal - digital data to digital signal - analog data to digital signal – client-server architecture: <ul style="list-style-type: none"> - the client controls the user interface and the application logic - server controls access to the database • displaying: <ul style="list-style-type: none"> – the phone as the display device with voice mail – EFTPOS terminal as a display device for electronic banking <p>issues related to communication systems</p> <ul style="list-style-type: none"> • the use of communication systems to share knowledge, not just data • issues related to messaging systems <ul style="list-style-type: none"> – ideas delivered by this means appear less forceful and caring than ideas delivered personally – danger of being misinterpreted – power relationships – privacy and confidentiality – electronic junk mail – information overload • implications of Internet trading including: <ul style="list-style-type: none"> – local taxation laws – employment ramifications – nature of business • trading over the Internet and its commercial implications • the difficulties of censoring content on the Internet • issues arising from Internet banking, including: <ul style="list-style-type: none"> – security of banking details – changing nature of work – branch closure and job loss 	<ul style="list-style-type: none"> • describe and justify the need for ethical behaviour when using the Internet • discuss the ethical issues that have arisen from use of the Internet, including: <ul style="list-style-type: none"> – the availability of material normally restricted – electronic commerce – domination of content and control of access to the Internet • identify the type of communication system in use for a given scenario

Students learn about:	Students learn to:
<ul style="list-style-type: none">• the removal of physical boundaries by enabling:<ul style="list-style-type: none">– work from home– virtual organisations, ie organisations structured around the communication system– removal of national and international barriers to trade• how participants are supported:<ul style="list-style-type: none">– individuals by providing a means for communication– participant teams by enabling the exchange of ideas and data• the emerging trend of accessing media such as radio and video across the Internet	<ul style="list-style-type: none">• be participants of a team and exchange ideas and data• design and implement a communication system to meet an individual need

9.4 Option Strands

There are FOUR options and students must study TWO of these. The topics are:

- Transaction Processing Systems
- Decision Support Systems
- Automated Manufacturing Systems
- Multimedia Systems.

9.4.1 Option 1: Transaction Processing Systems

Information systems that collect, store, modify and retrieve records of transactions are transaction processing systems. A transaction is an event that generates or modifies data that is eventually stored in an information system. Transaction processing systems meet record keeping and event tracking needs. In addition, analysing data stored in transaction processing systems may meet the information needs of end user(s). This option focuses on the information process of storing/retrieving. Other information processes are important in transaction processing and these are also considered.

Outcomes

A student:

- H1.1 applies an understanding of the nature and function of information technologies to a specific practical situation
- H1.2 explains and justifies the way in which information systems relate to information processes in a specific context
- H2.1 analyses and describes a system in terms of the information processes involved
- H2.2 develops solutions for an identified need which address all of the information processes
- H3.1 evaluates the effect of information systems on the individual, society and the environment
- H3.2 demonstrates ethical practice in the use of information systems, technologies and processes
- H4.1 proposes ways in which information systems will meet emerging needs
- H5.2 assess the ethical implications of selecting and using specific resources and tools.

Students learn about:	Students learn to:
<p>characteristics of transaction processing systems</p> <ul style="list-style-type: none"> • batch transaction processing as the collection/storage of data at the time of the event with actual updating when it is scheduled or there is enough data • real time transaction processing as the immediate processing of data • the significance of data validation in transaction processing • the historical significance of transaction processing as the first type of information systems • how transaction processing is easily computerised as it is based on clear sets of rules followed by clerks in equivalent manual systems <p>examples of transaction processing systems</p> <ul style="list-style-type: none"> • the components of a transaction processing system, including: <ul style="list-style-type: none"> – users of the information system as belonging to the same organisation that owns the transaction processing system – participants as the people who conduct the information processing – people from the environment becoming participants in real time systems as they directly enter transactions and perform validation • examples of real time transaction processing, including: <ul style="list-style-type: none"> – reservation systems – point of sale terminal – library loans • examples of batch processing, including: <ul style="list-style-type: none"> – clearing of presented cheques – generation of bills • systems that appear real time, computerising transactions as they occur, but actual updating is processed in batch, such as credit card transactions 	<ul style="list-style-type: none"> • identify, describe and use a batch transaction processing system • distinguish between the storage of collected data and the storage of processed data in a batch system • identify, describe and use a real time transaction processing system • compare and contrast batch and real time transaction processing • analyse an existing transaction processing system to determine its strengths and weaknesses • design and implement procedures for validating entered data • assess the work routine of a clerk in a manual transaction system to determine its suitability for automation <ul style="list-style-type: none"> • identify participants, data/information and information technology for the given examples of transaction processing systems • describe the relationships between participants, data/information and information technology for the given examples of transaction processing systems • diagrammatically represent the given examples of transaction systems using data flow diagrams and systems flow charts

Students learn about:	Students learn to:
<p>storing/retrieving in transaction processing systems</p> <ul style="list-style-type: none"> • storage of digital data in databases and files • retrieval of stored data to conduct further transaction processing such as printing invoices • systems to store paper records of transactions • data warehousing as a 'snapshot' copy of a real time transaction database for analysis • backup procedures, including: <ul style="list-style-type: none"> – grandfather, father, son – off-site storage – secure on-site storage – partial backups – recovery testing – tape as a suitable media – specialised backup software – sequential process • updating in batch: <ul style="list-style-type: none"> – used when transactions are recorded on paper – historical: the only feasible method when transaction details stored on punch cards and magnetic tape – sequential access in the update – steps in a batch update – information technology: hardware with large secondary storage, software that's not on-line for updates (but can be for analysis) and user interface not as important as real time updating • updating real time: <ul style="list-style-type: none"> – random access to data used – results from advances in technology – steps in real time update – information technology: hardware with large secondary storage, software that's on-line (on-line database) with user friendly interface 	<ul style="list-style-type: none"> • store digital data in databases and other files in such a way that it can be retrieved, modified and further processed • implement systems to store paper transactions • identify situations where data warehousing would be an advantage and assess the data to be stored • select and apply backup and recovery procedures to protect data • document, including diagrammatical representations, the steps in batch processing • document, including diagrammatical representations, steps in real time transaction processing • create and use a batch transaction processing system • create and use a real time transaction processing system <ul style="list-style-type: none"> • create user interfaces for real time and batch updating, and distinguish between them

Students learn about:	Students learn to:
<p>other information processes in transaction processing systems</p> <ul style="list-style-type: none"> • collecting in transaction processing: <ul style="list-style-type: none"> – hardware, including: <ul style="list-style-type: none"> - MICR for reading cheques - ATM - barcode readers – collection from forms – screen design for on-line data collection – web forms for transaction processing (real time and batch) • analysing data, output for transaction processing is input to different types of information systems, such as: <ul style="list-style-type: none"> – decision support – management information systems <p>issues related to transaction processing systems</p> <ul style="list-style-type: none"> • changing nature of work and the effect on participants, including: <ul style="list-style-type: none"> – the automation of jobs once performed by clerks – the bypassing of clerks by people in the environment performing with, for example collecting, ATM machines • the need for non-computer procedures to deal with transactions when the computer is not available in real time systems • bias in data collection: <ul style="list-style-type: none"> – when establishing the system and deciding what data to collect – when collecting data • the importance of data in transaction processing, including: <ul style="list-style-type: none"> – data security – data accuracy – data integrity • control in transaction processing and the implications it has for participants in the system 	<ul style="list-style-type: none"> • describe the operation of the listed hardware and how each is used to collect data for transaction processing • design and justify paper forms to collect data for batch processing • design user friendly screens for on-line data collection • identify existing procedures that may provide data for transaction processing <ul style="list-style-type: none"> • assess the impact on participants involved in transaction processing • identify jobs that have changed and/or jobs that have been created as a result of transaction processing, and report on the implications of these changes for participants in the system • discuss alternatives for when the transaction processing system is not available and explain why they need to be periodically tested • identify security, bias and accuracy problems that could arise from the actions of participants

9.4.2 Option 2: Decision Support Systems

When the task that end user(s) need to perform involves decision-making, the information system required is a decision support system. They can be used in situations that are unstructured, where there is no clear-cut path to the decision, or semistructured, where there is some indication of the path to take. Decision support systems use combinations of models, analytical tools, databases and automated processes to assist decision-making. Automated processing is achieved via intelligent systems that either focus on rules, such as expert systems, or pattern detection in data, such as neural networks. The interactive nature of decision support systems requires that user(s) have an understanding of analytical tasks. Decision support and intelligent systems make use of all information processes. This topic focuses on organising, analysing and processing.

Outcomes

A student:

- H1.1 applies an understanding of the nature and function of information technologies to a specific practical situation
- H1.2 explains and justifies the way in which information systems relate to information processes in a specific context
- H2.1 analyses and describes a system in terms of the information processes involved
- H2.2 develops solutions for an identified need which address all of the information processes
- H3.1 evaluates the effect of information systems on the individual, society and the environment
- H3.2 demonstrates ethical practice in the use of information systems, technologies and processes
- H4.1 proposes ways in which information systems will meet emerging needs
- H5.2 assess the ethical implications of selecting and using specific resources and tools

Students learn about:	Students learn to:
<p>characteristics of decision support</p> <ul style="list-style-type: none"> • decision support systems as those that assist user(s) in making a decision • the interactive nature of decision support systems • the nature of decision support systems which are not required to perform analytical tasks 	<ul style="list-style-type: none"> • select and recommend situations where decision support systems could be used

Students learn about:	Students learn to:
<p>processing and decision support</p> <ul style="list-style-type: none"> • structure of expert systems <ul style="list-style-type: none"> – knowledge base – database of facts – inference engine – explanation mechanism • types of inference engines, including: <ul style="list-style-type: none"> – forward chaining – backward chaining • certainty factors as a means of dealing with unclear situations • the use of macros to automate spreadsheet processing <p>analysing and decision support</p> <ul style="list-style-type: none"> • data mining • extracting summary data from a spreadsheet • comparing sequences of data for similarities and differences • spreadsheet analysis, including: <ul style="list-style-type: none"> – what-if models – statistical analysis – charts • data matching and database, neural networks and expert systems <p>other information processes</p> <ul style="list-style-type: none"> • collecting <ul style="list-style-type: none"> – identification of data for decision support systems – the role of the expert in the creation of expert systems – the role of the knowledge engineer in the creation of expert systems • storing/retrieving <ul style="list-style-type: none"> – using intelligent agents to search data 	<ul style="list-style-type: none"> • enter rules and facts into an expert system shell and use it to draw conclusions or make a diagnosis • describe situations better suited to forward chaining and those better suited to backward chaining • create a simple macro in a spreadsheet <ul style="list-style-type: none"> • search large databases for hidden patterns and relationships and use these to predict future behaviour • analyse alternatives using ‘what-if’ scenarios • make predictions based on the analysis of spreadsheets • use a simple neural network to match patterns • extract information from a database for analysis using a spreadsheet • compare and contrast data matching using database, neural networks and expert systems • distinguish between neural networks and expert systems <ul style="list-style-type: none"> • determine the sources of data for a decision support system for a given scenario • describe the operation of intelligent agents in situations such as search engines for the Internet

Students learn about:	Students learn to:
<p>issues related to decision support</p> <ul style="list-style-type: none"> • the reasons for intelligent systems in decision support, including: <ul style="list-style-type: none"> – preserving an expert’s knowledge – improving performance and consistency in decision-making – rapid decisions – ability to analyse unstructured situations • responsibilities of those performing data mining, including: <ul style="list-style-type: none"> – erroneous inferences – privacy • the emerging trend of group decision support systems and the communication it facilitates • responsibility for decisions that are made 	<ul style="list-style-type: none"> • describe the impact on participants in decision support systems when some of their decision-making is automated and recommend measures to reduce negative impacts • identify situations where user(s) of decision support systems also require knowledge in the area • determine whether the decisions suggested by intelligent decision support systems are reasonable • demonstrate responsible use of a decision support system by using its findings for the intended purpose only • use information technology to support group decisions • identify situation where decision support systems are of limited value

9.4.3 Option 3: Automated Manufacturing Systems

Manufacturing is the process of producing a product that meets a specific purpose. Manufacturing information systems support the production process in a number of ways, including the tracking of inventory, record keeping, the scheduling of production and carrying out production. Automated manufacturing systems have computerised controls built into the manufacturing equipment. Data is gathered through sensors and following some processing, a signal is sent to an actuator, a device that performs some mechanical action. While such information systems carry out all of the information processes, the information process focused on in this topic is collecting.

Outcomes

A student:

- H1.1 applies an understanding of the nature and function of information technologies to a specific practical situation
- H1.2 explains and justifies the way in which information systems relate to information processes in a specific context
- H2.1 analyses and describes a system in terms of the information processes involved
- H2.2 develops solutions for an identified need which address all of the information processes
- H3.1 evaluates the effect of information systems on the individual, society and the environment
- H3.2 demonstrates ethical practice in the use of information systems, technologies and processes
- H4.1 proposes ways in which information systems will meet emerging needs
- H5.2 assess the ethical implications of selecting and using specific resources and tools.

Students learn about:	Students learn to:
<p>characteristics of automated manufacturing systems</p> <ul style="list-style-type: none"> • automated manufacturing systems as information systems involved in production, by inventory tracking, record keeping, production scheduling and actual production • the direct users of these systems as <ul style="list-style-type: none"> – supervisors overseeing operation – people whose task is dependent on the system for information • the ability of these systems to collect data from the environment through a wide range of sensors, process this data into information and use this information to complete a physical task 	<ul style="list-style-type: none"> • identify and describe the features of automated manufacturing systems • describe how participants within these systems interact with the information technology within the system • represent the information technology within an automated manufacturing system with a block diagram • evaluate and refine block diagrams to show more detail for a given situation

Students learn about:	Students learn to:
<ul style="list-style-type: none"> • the use of microprocessors in these systems as the controller • block diagrams as a tool for describing the information technology within these systems <p>examples of automated manufacturing systems</p> <ul style="list-style-type: none"> • specific examples, including: <ul style="list-style-type: none"> – assembly line production such as the car industry – automated warehouses – CAD/CAM such as computing numerical control lathe systems – mail sorting • reasons for automation, including: <ul style="list-style-type: none"> – repetitive tasks – faster decision-making – safety – cost reduction – quality control – precision and acceptable tolerance range – productivity gains – design gains through simulating and modelling <p>collecting in automated manufacturing systems</p> <ul style="list-style-type: none"> • systems that collect data and information from participants via computer aided design software and directly link this to the rest of the system through computer aided manufacture • identification of the data to be collected and the most appropriate input device to do so • the physical operation and scientific principle(s) underlying sensors used to collect data, including: <ul style="list-style-type: none"> – temperature – pressure – motion – flow – light • barcode readers and inventory tracking • the analog nature of the data collected by the sensors and its conversion to digital for use in the system 	<ul style="list-style-type: none"> • identify participants, data/information and information technology for each example of automated manufacturing systems • discuss the relationships between participants, data/information and information technology for each example of automated manufacturing systems • outline the reasons for automation in each of the examples <ul style="list-style-type: none"> • discuss the relationship between CAD and CAM in manufacturing systems • use a CAD software package to reproduce a given design • identify data required by a manufacturing system • recommend the most appropriate device to collect data for a given scenario • describe the physical operation and the scientific principle(s) underlying this for each sensor • use a range of available sensors to collect data that could be used in an automated manufacturing system

Students learn about:	Students learn to:
<ul style="list-style-type: none"> • damping as the process that modifies the signal to the output device based on the input signal • types of damping, including <ul style="list-style-type: none"> – underdamping as a quick response to change leading to rapid fluctuations – overdamping as a slow response to change without fluctuations – critical damping as a quick response to change and quick return to stability <p>other information processes in manufacturing systems</p> <ul style="list-style-type: none"> • processing: <ul style="list-style-type: none"> – the trend to mass-production while meeting the needs of individuals – the different types of systems, including: <ul style="list-style-type: none"> - continuous - batch - discrete the features of each type of system, the types of tasks they perform and the scheduling of these tasks • displaying: <ul style="list-style-type: none"> – actuators as specialised display devices that perform a mechanical action under the control of the system – types of actuators, including: <ul style="list-style-type: none"> - solenoid - motor - stepping motor - relay - hydraulic pumps – the conversion from digital to analog to control actuators • transmitting and receiving: <ul style="list-style-type: none"> – noise as the interference in a signal – the causes of noise – ways of correcting noise 	<ul style="list-style-type: none"> • describe the operation of barcode readers and how they can assist in inventory tracking • describe the process of converting from analog to digital data and demonstrate this with available information technology • describe the changes in collected data that lead to a situation where damping is required • justify the type of damping for a given situation <ul style="list-style-type: none"> • identify manufacturing systems that quickly adapt to a particular need yet still mass produce, such as a car manufacturing plant that mass produces cars but in the colours required by customers • describe the features of each type of system • categorise and justify the categorisation of systems as either continuous, discrete or batch • recommend a suitable actuator for a given situation • distinguish between situations suitable for the use of each type of actuator • describe the process involved in converting a digital signal to an analog signal • identify noise in relation to signals within the system and recommend techniques for reducing it • construct a simple control system as the information technology for an automated manufacturing system using a block diagram

Students learn about:	Students learn to:
<p>issues related to automated manufacturing systems</p> <ul style="list-style-type: none"> • the changing nature at work resulting from automation in manufacturing technology • the advantages of semi-automation by leaving tasks to people that they are good at and lead to job satisfaction, including: <ul style="list-style-type: none"> – flexibility – common sense – ingenuity • the need to develop systems that are human-centred and assist participants to complete tasks, as opposed to machine-centred systems where humans assist machines • the reliability and quality of performing repetitive tasks such as: automatic painting, spot welding, newspaper production and computer embroidery • the improved safety as a result of automated manufacturing 	<ul style="list-style-type: none"> • discuss the arguments for and against automation from society’s perspective. • investigate the effect of de-skilling on participants in the information system. • describe the positive and negative impacts of working in an automated industry • classify systems as either machine-centred or human-centred and justify the classification • propose and develop human-centred information systems • describe situations where participants and automation functions work well together

9.4.4 Option 4: Multimedia Systems

Multimedia systems are information systems that combine the different types of media. Professional multimedia systems, especially when being created, involve many participants with a wide breadth of experience. Multimedia systems encompass the entire information process. This topic emphasises the information process of displaying.

Outcomes

A student:

- H1.1 applies an understanding of the nature and function of information technologies to a specific practical situation
- H1.2 explains and justifies the way in which information systems relate to information processes in a specific context
- H2.1 analyses and describes a system in terms of the information processes involved
- H2.2 develops solutions for an identified need which address all of the information processes
- H3.1 evaluates the effect of information systems on the individual, society and the environment
- H3.2 demonstrates ethical practice in the use of information systems, technologies and processes
- H4.1 proposes ways in which information systems will meet emerging needs
- H5.2 assess the ethical implications of selecting and using specific resources and tools.

Students learn about:	Students learn to:
<p>characteristics of multimedia systems</p> <ul style="list-style-type: none"> • multimedia systems as information systems that include combinations of the following media, including: <ul style="list-style-type: none"> – text, hypertext and numbers – audio – images and/or animations – video • the differences between print and multimedia, including: <ul style="list-style-type: none"> – different modes of display – interactivity and involvement of participants in multimedia systems 	<ul style="list-style-type: none"> • use multimedia systems in an interactive way and to identify how they control the presentation of information • identify multimedia software appropriate to manipulating particular types of data • create a document for publication in printed form and create a multimedia version with similar content • compare and contrast printed and multimedia versions with similar content

Students learn about:	Students learn to:
<ul style="list-style-type: none"> • the demands placed on hardware by multimedia systems, including: <ul style="list-style-type: none"> – primary and secondary storage capacity as a result of: <ul style="list-style-type: none"> - bit depth and the representation of colour data - sampling rates for audio data – processing as a result of: <ul style="list-style-type: none"> - video data and frame rates - image processing, including morphing and distorting - animation processing – display devices as a result of: <ul style="list-style-type: none"> - pixels and resolution • the variety of fields of expertise required in the development of multimedia applications, including: <ul style="list-style-type: none"> – content providers – system designers and project managers – those skilled in the collection and editing of each of the media types – those skilled in design and layout – those with technical skills with the information technology being used <p>examples of multimedia systems</p> <ul style="list-style-type: none"> • the major areas of multimedia use, including: <ul style="list-style-type: none"> – education and training: multimedia systems designed for teaching/learning – leisure and entertainment: multimedia systems such as computer games and other leisure activities – information: multimedia systems that provide information such as an information kiosk – virtual reality and simulations such as flight simulator – combined areas such as educational games • advances in technology which are influencing multimedia development such as: <ul style="list-style-type: none"> – World Wide Web and communication speed and capacity – CD-ROM speed – Digital Video Disc 	<ul style="list-style-type: none"> • summarise current information technology requirements for multimedia systems • distinguish between different approaches to animation including path-based and cell-based through practical investigations <ul style="list-style-type: none"> • describe the roles and skills of the people who design multimedia systems <ul style="list-style-type: none"> • identify participants, data/information and information technology for one example of a multimedia system from each of the major areas • describe the relationships between participants, data/information and information technology for one example of a multimedia system from each of the major areas • discuss environmental factors that will influence the design of a multimedia system for a given context, and recommend ways of addressing them • critically evaluate the effectiveness of a multimedia package within the context for which it has been designed • interpret developments that have led to multimedia on the World Wide Web • create multimedia systems that address new technological developments • compare and contrast multimedia presentations

Students learn about:	Students learn to:
<p>displaying in multimedia systems</p> <ul style="list-style-type: none"> • hardware for creating and displaying multimedia, including: <ul style="list-style-type: none"> – screens: CRT displays, LCD displays, touch screens – projection devices – speakers, sound systems – CD-ROM – video – head-up displays and head-sets • software for creating and displaying multimedia, including: <ul style="list-style-type: none"> – presentation software – application software such as word-processors with sound notes and video – authoring software – animation software – web browsers and HTML editors <p>other information processes in multimedia systems</p> <ul style="list-style-type: none"> • processing: <ul style="list-style-type: none"> – the integration of text and/or number, audio, image and/or video – compression and decompression of audio, video and images – hypermedia as the linking of different media to another • organising presentations using different storyboard layouts, including: <ul style="list-style-type: none"> – linear – hierarchical – non-linear – a combination of these • storing and retrieving: <ul style="list-style-type: none"> – the different file formats used to store different types of data – compression and decompression • collecting: <ul style="list-style-type: none"> – text and numbers in digital format – audio, video and images in analog format – methods for digitising analog data 	<ul style="list-style-type: none"> • describe how each of the listed hardware devices display multimedia and use a variety of them • implement features in software that support the displaying of multimedia and explain their use • use available hardware and software to display multimedia and interact with it • summarise the techniques for collecting, storing and displaying different forms of media and implement these in practical work • create samples of the different media types suitable for use in a multimedia display <ul style="list-style-type: none"> • describe the process of analog to digital conversion • plan a multimedia presentation using a storyboard • diagrammatically represent an existing multimedia presentation with a storyboard • design and create a multimedia presentation • combine different media types in authoring software • design and create a multimedia World Wide Web site that includes text and numbers, hypertext, images, audio and video • identify standard file formats for various data types such as JPEG, Quicktime, and MP3 • describe the compression of audio, image and video data and information • decide when data compression is required and choose an appropriate technique to compress data and later retrieve it • capture and digitise analog data such as audio or video

Students learn about:	Students learn to:
<p>issues related to multimedia systems</p> <ul style="list-style-type: none"> • copyright: the acknowledgment of source data and the ease with which digital data can be modified • appropriate use of the Internet and the wide spread application of new developments on it such as live video data • the merging of radio, television, communications and the Internet with the increase and improvements in digitisation • the integrity of the original source data in educational and other multimedia systems 	<ul style="list-style-type: none"> • evaluate and acknowledge all source material in practical work • use Internet based multimedia presentations in a responsible way • predict and debate new technological developments based on advancements in multimedia systems • cross-reference material supplied in multimedia presentations

10 Course Requirements

The *Information Processes and Technology Stage 6 Syllabus* comprises a Preliminary course and a HSC course, each of 120 hours (indicative time).

The Preliminary course is organised around four topics that relate to Introduction to Information Skills and Systems, Tools for Information Processes, Planning, Design and Implementation, and Personal and Group Systems and Projects. All topics and their related projects are based on the information processes and skills of collecting, organising, analysing, storing and retrieving, processing, transmitting/receiving and displaying.

The HSC course is organised around three core topics: Project Work, Information Systems and Databases, and Communication Systems, together with four optional strands. It is assumed students undertaking this course will have satisfied the required outcomes of the Preliminary course. The HSC course involves a core (60% total) and option topics (40% total).

Software and course specifications prescribed for Information Processes and Technology Stage 6

The software and course specifications prescribed for Information Processes and Technology Stage 6 Preliminary and HSC courses are published on the Board of Studies' website <http://www.boardofstudies.nsw.edu.au>

11 Post-school Opportunities

The study of Information Processes and Technology Stage 6 provides students with knowledge, understanding and skills that form a valuable foundation for a range of courses at university and other tertiary institutions.

In addition, the study of Information Processes and Technology Stage 6 assists students to prepare for employment and full and active participation as citizens. In particular, there are opportunities for students to gain recognition in vocational education and training. Teachers and students should be aware of these opportunities.

Recognition of Student Achievement in Vocational Education and Training (VET)

Wherever appropriate, the skills and knowledge acquired by students in their study of HSC courses should be recognised by industry and training organisations. Recognition of student achievement means that students who have satisfactorily completed HSC courses will not be required to repeat their learning in courses in TAFE NSW or other Registered Training Organisations (RTOs).

Registered Training Organisations, such as TAFE NSW, provide industry training and issue qualifications within the Australian Qualifications Framework (AQF).

The degree of recognition available to students in each subject is based on the similarity of outcomes between HSC courses and industry training packages endorsed within the AQF. Training packages are documents that link an industry's competency standards to AQF qualifications. More information about industry training packages can be found on the National Training Information Service (NTIS) website (www.ntis.gov.au).

Recognition by TAFE NSW

TAFE NSW conducts courses in a wide range of industry areas, as outlined each year in the *TAFE NSW Handbook*. Under current arrangements, the recognition available to students of Information Processes and Technology Stage 6 in relevant courses conducted by TAFE is described in the *HSC/TAFE Credit Transfer Guide*. This guide is produced by the Board of Studies and TAFE NSW and is distributed annually to all schools and colleges. Teachers should refer to this guide and be aware of the recognition available to their students through the study of Information Processes and Technology Stage 6. This information can be found on the TAFE NSW website (www.tafensw.edu.au/mchoice).

Recognition by other Registered Training Organisations

Students may also negotiate recognition into a training package qualification with another Registered Training Organisation. Each student will need to provide the RTO with evidence of satisfactory achievement in Information Processes and Technology Stage 6 so that the degree of recognition available can be determined.

12 Assessment and Reporting

12.1 Requirements and Advice

The information in this section of the syllabus relates to the Board of Studies' requirements for assessing and reporting achievement in the Preliminary and HSC courses for the Higher School Certificate .

Assessment is the process of gathering information and making judgements about student achievement for a variety of purposes.

In the Preliminary and HSC courses those purposes include:

- assisting student learning
- evaluating and improving teaching and learning programs
- providing evidence of satisfactory achievement and completion in the Preliminary course
- providing the Higher School Certificate results.

Reporting refers to the Higher School Certificate documents received by students that are used by the Board to report both the internal and external measures of achievement.

NSW Higher School Certificate results will be based on:

- **an assessment mark** submitted by the school and produced in accordance with the Board's requirements for the internal assessment program
- **an examination mark** derived from the HSC external examinations.

Results will be reported using a course report containing a performance scale with bands describing standards of achievement in the course.

The use of both internal assessment and external examinations of student achievement allows measures and observations to be made at several points and in different ways throughout the HSC course. Taken together, the external examinations and internal assessment marks provide a valid and reliable assessment of the achievement of the knowledge, understanding and skills described for each course.

Standards Referencing and the HSC Examination

The Board of Studies will adopt a standards-referenced approach to assessing and reporting student achievement in the Higher School Certificate examination.

The standards in the HSC are:

- the knowledge, skills and understanding expected to be learned by students — the *syllabus standards*
- the levels of achievement of the knowledge, skills and understanding — the *performance standards*.

Both *syllabus standards* and *performance standards* are based on the aims, objectives, outcomes and content of a course. Together they specify what is to be learned and how well it is to be achieved.

Teacher understanding of standards comes from the set of aims, objectives, outcomes and content in each syllabus together with:

- the performance descriptions that summarise the different levels of performance of the course outcomes
- HSC examination papers and marking guidelines
- samples of students' achievement on assessment and examination tasks.

12.2 Internal Assessment

The internal assessment mark submitted by the school will provide a summation of each student's achievements measured at points throughout the course. It should reflect the rank order of students and relative differences between students' achievements.

Internal assessment provides a measure of a student's achievement based on a wider range of syllabus content and outcomes than may be covered by the external examination alone.

The assessment components, weightings and task requirements to be applied to internal assessment are identified on page 66. They ensure a common focus for internal assessment in the course across schools, while allowing for flexibility in the design of tasks. A variety of tasks should be used to give students the opportunity to demonstrate outcomes in different ways and to improve the validity and reliability of the assessment.

12.3 External Examination

In Information Processes and Technology Stage 6 the external examinations includes a written paper for external marking. The specifications for the examination in Information Processes and Technology Stage 6 are on page 67.

The external examination provides a measure of student achievement in a range of syllabus outcomes that can be reliably measured in an examination setting.

The external examination and its marking and reporting will relate to syllabus standards by:

- providing clear links to syllabus outcomes
- enabling students to demonstrate the levels of achievement outlined in the course performance scale
- applying marking guidelines based on established criteria.

12.4 Board Requirements for the Internal Assessment Mark In Board Developed Courses

For each course the Board requires schools to submit an assessment mark for each candidate.

The collection of information for the HSC internal assessment mark must not begin prior to the completion of the Preliminary course.

The Board requires that the assessment tasks used to determine the internal assessment mark must comply with the components, weightings and types of tasks specified in the table on page 66.

Schools are required to develop an internal assessment program which:

- specifies the various assessment tasks and the weightings allocated to each task
- provides a schedule of the tasks designed for the whole course.

The school must also develop and implement procedures to:

- inform students in writing of the assessment requirements for each course before the commencement of the HSC course
- ensure that students are given adequate written notice of the nature and timing of assessment tasks
- provide meaningful feedback on students' performance in all assessment tasks
- maintain records of marks awarded to each student for all assessment tasks
- address issues relating to illness, misadventure and malpractice in assessment tasks
- address issues relating to late submission and non-completion of assessment tasks
- advise students in writing if they are not meeting the assessment requirements in a course and indicate what is necessary to enable the students to satisfy the requirements
- inform students about their entitlements to school reviews and appeals to the Board
- conduct school reviews of assessments when requested by students
- ensure that students are aware that they can collect their Rank Order Advice at the end of the external examinations at their school.

12.5 Assessment Components, Weightings and Tasks

Preliminary Course

The suggested components, weightings and tasks for the Preliminary course are set out below.

Component	Weighting	Tasks may include:
Introduction to Information Skills and Systems	20%	<ul style="list-style-type: none"> • project work • essays • tests • oral presentations • portfolios of students' work • structured interview • student-teacher discussion • oral presentations • student logs and journal • practical assignments • practical mastery tests • student explanation and demonstration
Tools for Information Processes	40%	
Planning, Design and Implementation	20%	
Personal and Group Systems and Projects	20%	
Marks	100%	

There should be a balance between the assessment of:

- knowledge and understanding outcomes and course content; and
- skills outcomes and course content.

HSC Course

The internal assessment mark for Information Processes and Technology Stage 6 is to be based on the HSC course only. Final assessment should be based on a range and balance of assessment instruments.

Component	Weighting	Tasks may include:
Project Work	20%	<ul style="list-style-type: none"> • project work • essays • tests • oral presentations • portfolios of students' work • structured interview • student-teacher discussion • oral presentations • student logs and journal • practical assignments • practical mastery tests • student explanation and demonstration
Information Systems and Databases	20%	
Communication Systems	20%	
Option Strands	40%	
Marks	100	

There should be a balance between the assessment of:

- knowledge and understanding outcomes and course content; and
- skills outcomes and content

One task may be used to assess several components. It is suggested that 3–5 tasks are sufficient to assess the HSC course outcomes.

12.6 HSC External Examination Specifications

Time allowed: 3 hours (plus 5 minutes reading time)

This paper is divided into three sections

Section I (20 marks)

- This section will be based on the core topics: Project Work, Information Systems and Databases, and Communication Systems.
- There will be TWENTY multiple-choice questions.
- All questions are compulsory.

Section II (40 marks)

- This section will be based on the core topics: Project Work, Information Systems and Databases, and Communication Systems.
- There will be FOUR structured free response questions.
- All questions are compulsory.

Section III (40 marks)

- There will be FOUR questions, based on the options of Transaction Processing Systems, Decision Support Systems, Automated Manufacturing Systems, Multimedia Systems.
- Candidates must attempt TWO questions (20 marks each).
- All questions will be of equal value.

12.7 Summary of Internal and External Assessment

Internal Assessment	Weighting	External Assessment	Weighting
Project Work	20	Section I (20 multiple-choice questions)	20
Information Systems and Databases	20	<ul style="list-style-type: none"> – Project Work – Information Systems and Databases – Communication Systems 	
Communication Systems	20	Section II (Four structured free response questions)	40
Option Strand	40	<ul style="list-style-type: none"> – Project Work – Information Systems and Databases – Communication Systems 	
<ul style="list-style-type: none"> – Transaction Processing Systems – Decision Support Systems – Automated Manufacturing Systems – Multimedia Systems 		Section III (students attempt two questions from four optional questions)	40
		<ul style="list-style-type: none"> – Transaction Processing Systems – Decision Support Systems – Automated Manufacturing Systems – Multimedia Systems 	
Marks	100	Marks	100

12.8 Reporting Student Performance Against Standards

Student performance in an HSC course will be reported against standards on a course report. The course report contains a performance scale for the course describing levels (bands) of achievement, an HSC examination mark and the internal assessment mark. It will also show, graphically, the statewide distribution of examination marks of all students in the course.

Each band on the performance scale (except for band 1) includes descriptions that summarise the attainments typically demonstrated in that band.

The distribution of marks will be determined by students' performances against the standards and not scaled to a predetermined pattern of marks.

13 Glossary

bit depth	The number of bits devoted to each pixel For example, 256 colours requires 8 bits.
certainty factors	A means by which an expert system deals with partial or uncertain information. They are usually built in by the knowledge engineer or entered by the user when using the system. A certainty factor of 1 means the expert or user is completely certain of the information, while a certainty factor of 0 means they are completely uncertain or have 'no opinion' on the certainty of the information.
CNC lath	Computer Numerically Controlled lath.
damping	The process of modifying the magnitude of the response of a system that is controlled by a computer.
data mining	The use of data analysis tools to try to find the patterns in large transaction databases.
data warehouse	Hardware and software that extracts data from a transaction database and stores it separately for analysis and archival purposes rather than transaction processing.
display	Used in a broad sense to include all output from an information system. Includes not only printed and video output, but also audio output and electronic signals that control a device.
end user(s)	Those people in the organisation who are the real users running application programs, generating reports and so on, to help them do their jobs.
entity	A specific thing about which an information system collects information.
flash memory	A semiconductor device that stores and modifies data while the computer is operating, but that also retains data when the computer is turned off.

grandfather, father, son	A backup procedure that enables generations of backups where the most recent backup is the son, the second last is the father, and the oldest is the grandfather. When the next backup is due, the grandfather media will be used becoming the new son.
guided processes	Features in software that assist the user complete a task, such as wizards and the like.
head-up displays	Specialised displays originally developed for military applications. They have been used in some automobiles to project auto control panel information in front of the driver instead of forcing the driver to look down.
including	All items in the list should be covered. Additional items may be added.
intelligent agent	An autonomous, goal-directed computerized process launched into a computer system or network to perform work while other processes are continuing.
metadata	Information defining data in the information system.
methodical	Performing a task in a systematic way.
namely	Only listed items should be covered. No other items should be added.
such as	Items in the list are only examples, they need not be the ones covered in a teaching program.
teleconferencing	The use of electronic transmission to permit same-time, different-place meetings.
view	The restricted portion of the database, visible to the user, allowing them to complete a task that requires access to the database.