

Computer and Information Technology (S4-5)

Second Consultation Draft

Curriculum Development Council

Joint Working Group on S4-5 Computer and Information Technology

Hong Kong Special Administrative Region of

the People's Republic of China

May 2002



1. Information Processing and Presentation

Overall Expectations



Students are expected to have a basic understanding of what information processing is and how the common application software can be used as information processing tools to process and present information efficiently and effectively. Upon completing the topic, students should also have a concern about the reliability and objectivity of information and be aware that these issues are sometimes not resolved even with the sophisticated information processing tools.

Students should:

- Be aware of the different applications of information technology in our everyday life;
- Appreciate how the advancement of information technology fosters the emergence and development of the Information Age, and vice versa;
- Understand the difference between information and data, as well as the basic concepts underlying the generation of useful information from raw data;
- Understand the meaning of fields, records, tables and databases in organising related data into meaningful information;
- Be able to use the basic features of the common application software efficiently;
- Be able to select the appropriate tools to process different types of information;
- Be able to integrate the use of the common application software to process and present information; and
- Understand and apply concepts for effective communication in their presentations.

The time allocation for the topic is about 20 hours.

Students are expected to have the knowledge and skills pertaining to Stage III of the Information Technology Learning Targets.

Additional Information



Students' study of the topic can include the following sub-topic areas:

The Information Age

- Applications of information technology in our everyday life
- Information technology and the Information Age

Basic concepts underlying the generation of useful information from raw data

- Difference between data and information
- Data collection and data preparation
- Sources of error, data validity and data control
- Processing data, including searching, sorting, merging
- Processing information, including reorganisation, conversion, communication and transmission

Integrated use of common application software

Criteria for effective presentation of information

- Different ways to present information
- Meaning of multimedia and using multimedia elements in a presentation
- Merits of using multimedia elements
- Planning for a successful presentation
- Selecting appropriate information for presentation
- Organising the relevant information
- Introducing interactive elements
- Conducting an effective presentation

Note: The above listing represents only one way of organising the relevant contents and is by no means the only way to deliver the curriculum. Teachers should plan and organise their teaching according to the students' needs, their pre-requisite knowledge, and how the topic is related to the other content areas.

As students may have different IT skills when taking the course, teachers should also adjust the teaching time accordingly.

Students are expected to have sufficient exposure to a variety of learning activities, such as designing a survey form for data input, preparing a slide show that runs automatically, etc., for them to generate the required concepts, instead of teachers expounding the underlying theories only.

Students' knowledge on multimedia in this topic should be confined to using these elements and constructing simple ones, instead of constructing sophisticated ones from scratch.



2. Computer Systems and Networking

Overall Expectations



Students are expected to have a basic understanding of how the different components of a simple computer system, including its hardware and software, work together to perform tasks. Their knowledge of the computer system should be extended to a general awareness of how and why computers are connected to form a network at home, in school and in the workplace. Students should have exposure to a variety of operating systems and be aware of the major trends in the development of the hardware and software.

Students should:

- Understand the basic components of a computer system;
- Understand the functions and properties of the major hardware, including the major peripheral devices, and be able to select the appropriate hardware to meet specific purposes, based upon an understanding of these functions and properties;
- Understand the general characteristics of the operating system;
- Understand why computers are usually connected nowadays to form a network;
- Understand how computers can be connected locally to form a Local Area Network (LAN) and over a long distance to form a Wide Area Network (WAN);
- Be able to use and describe the common services available in a networked environment; and
- Develop the habits of operating a computer considerately, managing its files and resources regularly, and be able to use the common backup, compression, system protection and file protection utilities to maintain system and file integrity.

The time allocation for the topic is about 16 hours.

Students' study of the topic can include the following sub-topic areas:

Typical hardware components

- Central Processing Unit (CPU)
- Bus system
- Read Only Memory (ROM) and Random Access Memory (RAM)
- Input / Output (I/O) devices
- Secondary storage devices
- Interface cards

Typical properties of hardware

- Computational power
- Storage capacity
- Data transfer rate
- Other appropriate properties

Selecting the appropriate hardware for specific purposes

System software and application software

- Basic ideas about system software, application software and driver programs
- Basic functions of the operating system
- Some common operating systems and their differences, including operating systems in other electronic devices such as the Personal Digital Assistants (PDAs)
- Cross-platform issues

Basic concepts of a computer network

- The need for a computer network at home, in school and in the workplace
- A LAN verse a WAN
- Basic requirements for connecting to a computer network
- Common services available in a networked environment

Note: The above listing represents only one way of organising the relevant contents and is by no means the only way to deliver the curriculum. Teachers should plan and organise their teaching according to the students' needs, their pre-requisite knowledge, and how the topic is related to the other content areas.

The study of the topic should be related the other topics studied in the core module, such as the topic "Internet and its Applications" and the topic "Social Implications of Computer and Information Technology".

Additional Information





3. Internet and its Applications

Overall Expectations



Students are expected to have a basic understanding of the use and development of the Internet and the World Wide Web (WWW).

Students should:

- Understand the concepts underlying the development of the Internet and the WWW;
- Be able to participate in Internet activities, including searching for information using the search engines, browsing information, sending and receiving e-mails, uploading and downloading files;
- Be aware of the kinds of personal, social or commercial activities that are available on the Internet, including e-Commerce, e-Learning and public services accessible through the Internet;
- Be aware of the risks when engaging in Internet activities, and be able to apply appropriate measures to safeguard themselves in undertaking such activities;
- Be aware of the impacts of the Internet technology on our everyday life;
- Be able to connect to the Internet and aware of the technologies underlying the operation of the Internet, including the role of the service providers, the types of connection and access, the use of protocols such as Transmission Control Protocol/Internet Protocol (TCP/IP), the use of domain names and domain name servers; and
- Be able to construct simple web pages and apply the knowledge and skills of hyperlinks and multimedia in constructing web pages.

The time allocation for the topic is about 16 hours. Students should also be able to apply concepts on effective communication in the design and construction of web pages.

Students' study of the topic can include the following sub-topic areas:

Internet and the Internet technology

- Historical development of the Internet and the WWW
- Making connections: hardware requirements, types of connection, types of access
- TCP/IP as an example
- IP address, Domain names and domain name servers

Internet activities

- Search engines and skills in searching for information on the Internet
- Web browsing, e-mail, file transfer, video-conferencing
- e-Commerce: business models and impacts on our everyday life
- e-Learning and impacts on our everyday life
- Public services accessible through the Internet
- Issues arising from unlawful and unethical Internet activities

Web authoring

- Markup language as a means to address cross-platform issues
- A brief introduction to Hypertext Markup Language (HTML)
- Using a web authoring tool to construct simple web pages
- Incorporating multimedia elements
- Incorporating hyperlinks

Note: The above listing represents only one way of organising the relevant contents and is by no means the only way to deliver the curriculum. Teachers should plan and organise their teaching according to the students' needs, their pre-requisite knowledge, and how the topic is related to the other content areas.

Students should be able to apply their knowledge on multimedia as described in the core, in constructing simple web pages.

The study of the topic should be related the other topics studied in the core module, such as “ Information Processing and Presentation” , “ Computer Systems and Networking” and “ Social Implications of Computer and Information Technology” .

Additional Information





4. Basic Programming Concepts

Overall Expectations



Students are expected to have a basic understanding of computer programming, how to solve problems in a systematic way and what are some of the skills and methods involved. Students are expected to learn the logic behind, through short program segments or similar means, instead of learning the syntax of a particular programming language.

Students should:

- Understand the meaning of problem solving and appreciate the use of a systematic approach to solve problems;
- Be able to apply concepts of systematic problem solving to real life problems;
- Be aware of a brief historical development of the programming languages and understand the differences between a high level programming language and a low level programming language;
- Understand the difference among the different translators: the compiler, the interpreter and the assembler;
- Understand the meaning of an algorithm and a program flowchart;
- Be able to identify the objective(s) of an algorithm from an examination of its program flowchart;
- Appreciate that there are different ways of solving the same problem, and be able to make simple comparison among them;
- Be able to trace the logical flow, identify the values of variables during execution and debug logical errors in segments of a program flowchart, or other means of realising the solution of a problem;
- Be able to recognise the basic constructs of a computer program; and
- Appreciate the importance of good programming habits, such as clear documentation, use of meaningful variables, use of the modular approach, etc.

The time allocation for the topic is about 18 hours.

Students' study of the topic can include the following sub-topic areas:

Problem solving procedures

- The need for a systematic way of solving problems
- Problem solving procedures: problem identification, problem analysis, designing an algorithm, developing a solution, debugging and testing, documentation
- Real life application of the problem solving procedures and some practical considerations
- Using a program flowchart to realise the algorithm
- Different ways to solve the same problem and their brief comparison

Programming languages

- Roles of a programming language in the realisation of an algorithm
- Historical development of programming languages
- High level and low level programming languages: their needs, characteristics and examples
- Functions of the different translators: compiler, interpreter and assembler

Programming concepts in using a high level programming language

- Input, output, assignment of values to variables
- Using constructs such as branching and iteration structures
- Tracing program flow: identifying values of variables and debugging logical errors

Note: The above listing represents only one way of organising the relevant contents and is by no means the only way to deliver the curriculum. Teachers should plan and organise their teaching according to the students' needs, their pre-requisite knowledge, and how the topic is related to the other content areas.

As the topic aims to encourage logical and analytical thinking, teachers are encouraged to use samples of program segments whose length and complexity are appropriate to the students' cognitive level. Students' learning of the concepts should be focused on their ability to apply appropriate logic and design in the construction of program segments or flowcharts, and whether their proposals can meet given requirements.

Additional Information





5. Social Implications of Computer and Information Technology

Overall Expectations



Students are expected to have a basic understanding of issues brought forth by the advancement of computer and information technology. The issues range from those that are legal or ethical in nature, to those that are related to health, the environment or a change in life style.

Students should:

- Understand the legal and ethical issues related to the use of computer and information technology;
- Understand the health and environmental issues related to the advancement of the computer and information technology;
- Understand how the computer and information technology has changed their life styles;
- Appreciate the need to use the computer and information technology legally, ethically and sensibly;
- Develop a care and concern towards the proper use of computer and information technology, as well as a positive attitude towards the application of these technologies, including technologies for the future.

The time allocation for the topic is about 10 hours.

Additional Information



Students' study of the topic can include the following sub-topic areas:

Legal and ethical issues

- Intellectual Property Right (IPR), including copyright issues and software licensing
- Data privacy
- Unauthorised access, including hacking and cracking
- Indecent and deceitful materials
- Spam and other issues

Issues related to health, environment or a change in life style

- Occupational safety: ergonomic and stress issues
- Environmental issues of computer equipment
- Turnover rate of computer equipment
- The cashless society
- Digital certification
- The knowledge-based society
- Globalisation

Impacts of upcoming technologies, such as technologies related to increasing bandwidth, mobile technology, smart home technology, etc.

Ways to protect ourselves: from property loss, from being hacked, offended, injured or impersonated

Note: The above listing represents only one way of organising the relevant contents and is by no means the only way to deliver the curriculum. Teachers should plan and organise their teaching according to the students' needs, their pre-requisite knowledge, and how the topic is related to the other content areas.

Students should be given sufficient opportunities to discuss and debate the issues for them to reflect, conceptualise and refine ideas, to develop their critical thinking and communication skills, as well as formulating their own personal judgements.

The study of the topic should be related the other topics studied in the core module.

Elective Module (A)

Algorithm and
Programming

Organisation
of Computer

Data Communications
and Networking

Multimedia Production
and Web Authoring

Algorithm and Programming

The elective **Algorithm and Programming** is built upon the **Basic Programming Concepts** in the core module. Students are expected to have further understanding of computer programming. They should be able to design and develop computer programs on their own for solving problems. They should be given opportunities to improve their high order thinking skills, including logical thinking and problem solving skills, and apply them in different contexts. Students should be able to write programs for different purposes, like solving mathematical problems, designing games, computer simulation, and business applications, etc. Students may use any appropriate programming language to realise the programming concepts and techniques discussed in this module.

Overall Expectations

In summary, students should be able to:

- Define and analyse problems;
- Formulate algorithms for solving problems;
- Apply programming concepts and techniques to realise designed algorithms in computer programs;
- Design and develop programs;
- Develop good programming styles, including modularity of programs, use of informative variable identifiers, indentation, spacing, etc.;
- Debug computer programs to ensure that the programs execute as expected;
- Develop program documentation to summarise the design and to improve the readability of the programs; and
- Understand the design and algorithms of computer programs developed by others, through tracing, reading documentation, intuition, or any appropriate means, to develop the skills to provide maintenance and support.

The time allocation for the elective is about 30 hours.

Details of the Elective

The elective *Algorithm and Programming* comprises three topics, namely '*Design Techniques*', '*Program Development*' and '*Algorithm and Data Structure*'. Further information on the three topics is summarised as follows:

Topics	Remarks
(A) Design Techniques	
<ul style="list-style-type: none"> • Program development procedures: problem definition, problem analysis, algorithm design, program coding, program debugging/testing, and program documentation 	<ul style="list-style-type: none"> • Students should understand the procedures commonly used in developing programs. They should realise that sometimes the procedures may not be applied in sequence. The procedures may sometimes require iteration, too. • Students should be able to identify the necessary inputs and expected outputs of a program when analysing a problem. • Students should understand the concepts of modularity and stepwise refinement as examples of problem analysis techniques. • Students should realise that program documentation (e.g. the titles, lists and definitions of variables, test data, sample output, internal documentation, etc.) is intended to make the program comprehensible. They should be able to read the documentation and develop the habit of documenting their programs.
<ul style="list-style-type: none"> • Problem-solving approaches 	<ul style="list-style-type: none"> • Students should understand the meaning of the top-down, bottom-up, and trial-and-error approaches. They should be able to apply these problem solving approaches in developing programs. They should realise that the top-down approach is often emphasised. However, other approaches can be used as well.
<ul style="list-style-type: none"> • Selection of programming languages 	<ul style="list-style-type: none"> • Students should be aware that there exist different types of programming paradigm, such as imperative programming, object-oriented programming, logic programming, etc. • Students should also be aware that different programming languages are designed to different specific purposes.
(B) Program Development	
<ul style="list-style-type: none"> • Writing programs 	<ul style="list-style-type: none"> • Students should understand the meaning of the basic data types: integer, real number, character, string, and Boolean, as well as structured data types: one-dimensional array and two-dimensional array. They should understand why there are different types of data and how these data are manipulated in a program. • Students should be able to use expressions of arithmetic operations, string operations and Boolean operations, built-in functions, assignment statements, input statements, output statements to manipulate data. • Students should be able to use subprograms and programming constructs, such as selection structures, counter-controlled loops, conditional loops, nested loops to develop programs. • Students should be able to write file handling statements to manipulate text files.

Topics	Remarks
<ul style="list-style-type: none">• Program development tools and program execution	<ul style="list-style-type: none">• Students should have the authentic experience in using program development tools to develop their programs. They should use the various features provided by the tools to load, save, edit, compile, execute, print and debug programs.• Students should be able to use library functions.
<ul style="list-style-type: none">• Debugging and Testing	<ul style="list-style-type: none">• Students should be able to debug program execution with manual methods and software debugging tools.• Students should be able to identify and correct syntax, logical, and runtime errors in programs, and test programs using a full range of test cases.
<hr/> <p>(C) Algorithm and Data Structure</p>	
<ul style="list-style-type: none">• Understanding and applying the following algorithms in programming: counting, accumulating, swapping, sorting, searching, merging two sorted arrays	
<ul style="list-style-type: none">• Formulation of algorithms according to the specification of a problem and the input/output requirements	<ul style="list-style-type: none">• Students should be able to formulate algorithms for problems and realise algorithms into computer programs.• Students should realise that there exist different algorithms for the same problem and make simple comparison among them.
<ul style="list-style-type: none">• Features of an array, a queue, a stack and a linked list	<ul style="list-style-type: none">• Students should understand that data can be organised conceptually as different structures. They should be able to select and use appropriate data structure to store and represent data in a program.

Elective Module (B)

Algorithm and
Programming

Organisation
of Computer

Data Communications
and Networking

Multimedia Production
and Web Authoring

Organisation of Computer

The elective **Organisation of Computer** is built upon the topic **Computer Systems and Networking** in the core module. Students are expected to have further understanding of a computer system, its hardware, its configuration, ways to optimise its performance, and some troubleshooting techniques. They should also be aware of the characteristics of the different personal computers and the operating systems they can use.

Overall Expectations

In summary, students should be able to:

- Compare and contrast the different families of personal computers available in the market and the operating systems they can use;
- Explain briefly the factors that affect the performance of the CPU;
- Identify and explain the use of the functional units of the main board and the different add-on cards;
- Explain basic concepts underlying the operation of a personal computer, such as the meaning of an instruction set, the roles and functions of the Arithmetic and Logic Unit (ALU), Control Unit (CU), registers, Direct Memory Access (DMA), Basic Input-Output System (BIOS), cache and virtual memory, etc.;
- Identify the different bus systems in a personal computer and explain the differences among them;
- Identify the different ports and interfaces for connecting with peripheral units and explain their differences;
- Describe briefly the steps involved in the boot process and how the operation and performance of a personal computer can be fine-tuned by modifying its configuration;
- Make suggestions on the hardware and configuration of a personal computer for meeting particular purposes; and
- Develop basic skills in troubleshooting, performance enhancement and daily maintenance of personal computers.

The time allocation for the elective is about 30 hours.

Details of the Elective

The elective *Organisation of Computer* comprises four topics, namely '*Overview of Personal Computers*', '*CPU, Main Board, Memory and I/O Interfaces*', '*System Configuration*' as well as '*Basic Computer Maintenance and Troubleshooting Techniques*'. Further information on the topics is summarised as follows:

Topics	Remarks
(A) Overview of Personal Computers	
<ul style="list-style-type: none"> • Evolution of personal computers 	<ul style="list-style-type: none"> • Students should be able to describe briefly the history of the personal computers and how it is related to the development of computer technology.
<ul style="list-style-type: none"> • Family of personal computers 	<ul style="list-style-type: none"> • Students should be aware of the existence of the different families of personal computers and be able to describe the major differences among them.
(B) CPU, Main board, Memory and I/O Interfaces	
<ul style="list-style-type: none"> • Performance of the CPU and the instruction sets 	<ul style="list-style-type: none"> • Student should know that the performance of the CPU is affected by factors such as the integrated circuit technology, clock rate, word size, size of the cache, complexity of the instruction set, advanced technology like pipelining and parallel processing, etc. • Students should be aware of the roles and functions of key components such as the ALU, CU, and registers.
<ul style="list-style-type: none"> • The main board 	<ul style="list-style-type: none"> • Students should be aware of the typical layout of the main board and examine some of its functional units, such as the CPU socket/slot, chipsets, memory and expansion slots, etc. • Students should be aware that some functional units have now been built in the main board, such as the audio interface, the graphics interface, and the network interface, but the majority of the system expansion and upgrading are performed through various add-on interface adapters.
<ul style="list-style-type: none"> • RAM, ROM, BIOS, cache and virtual memory 	<ul style="list-style-type: none"> • Students should have a basic understanding of the roles and functions of these units. They should also know the relationship between bits, bytes, kilobytes (KB), megabytes (MB), gigabytes (GB) and terabytes (TB).
<ul style="list-style-type: none"> • Buses, I/O Interfaces and peripheral handling 	<ul style="list-style-type: none"> • Students should know that there are different buses for connecting the different parts of a personal computer, and different ports for connecting with different peripheral devices. Students should know the characteristics of these buses and ports. • Students should be aware of the roles and functions of DMA and interrupts in handling peripherals.

Topics	Remarks
<ul style="list-style-type: none"> Emergence of industrial standards 	<ul style="list-style-type: none"> Students should know that there are different industrial standards established for interfacing different parts of the personal computers. They should be aware of some of the examples and should know how these standards are usually set. They should be given sufficient opportunities to discuss the pros and cons of having standards.
(C) System configuration	
<ul style="list-style-type: none"> Configuring the BIOS 	<ul style="list-style-type: none"> Students should be aware of the steps involved in a boot process and the use of each step. Students should know some of the functions of the BIOS and be able to change its settings to alter the system configuration.
<ul style="list-style-type: none"> System software: the operating systems, device drivers and utilities 	<ul style="list-style-type: none"> Students should understand the characteristics of the different common operating systems and be able to select the appropriate one for meeting particular purposes. Students should understand the roles and functions of the device drivers and be able to install them. Students should have the experience of working with the different utility software, such as those for protecting the computer from virus infection, those for providing firewall services, the disk repair/recovery utilities, the performance enhancement software, etc.
(D) Basic Computer Maintenance and Troubleshooting Techniques	
<ul style="list-style-type: none"> Assembling your own computer system 	<ul style="list-style-type: none"> Students should have the hands-on experience of assembling a personal computer, including the installation of the operating system and the other appropriate hardware and software to meet specific performance requirements. Students should be aware of the compatibility issues in selecting hardware components.
<ul style="list-style-type: none"> Basic computer maintenance 	<ul style="list-style-type: none"> Students should develop the concept of symptom, cause and solution, and be aware of the hazards associated with the use of some special devices (e.g. the high voltage or the laser beam involved). They should be able to implement safety measures to safeguard themselves in performing computer maintenance. Students should develop the skills to monitor system performance and be able to analyse critical situations to make recommendations to improve performance.
<ul style="list-style-type: none"> Basic troubleshooting techniques 	<ul style="list-style-type: none"> Students should have the experiences of performing troubleshooting and analysis of problems associated with the operation of a personal computer.

Elective Module (C)

Algorithm and
Programming

Organisation
of Computer

**Data Communications
and Networking**

Multimedia Production
and Web Authoring

Data Communications and Networking

The elective **Data Communications and Networking** is built upon the **Computer Systems and Networking** and **Internet and Its Applications** in the core module. Students opting for this module are expected to have a better understanding of data communication networks, how they work, the advantages of having a networked environment, applications and other potential usage of a computer network. In particular, this module would explore the common features of Internet applications and the applications of local area networks.

Overall Expectations

In summary, students should be able to:

- Identify different types of communication networks and the major components involved;
- Understand the basic principles underlying how communication networks work, and the importance of establishing protocols;
- Understand the concepts and technology behind the Internet, identify various tools and services available on the Internet, and be aware of the rapid growth of e-Commerce;
- State the advantages of establishing a Local Area Network (LAN);
- Identify the components, understand the standards and topology used, and explore the performance of a LAN, using Ethernet as an example;
- Carry out simple network design activities and identify major issues concerning the management and security of a networked environment; and
- Suggest measures to improve the performance, management and security of a network.

The time allocation for the elective is about 30 hours.

Details of the Elective

The elective *Data Communications and Networking* comprises four topics, namely '*An Overview of Data Communications and Networking*', '*The Internet, Local Area Networks*' and '*Network Design, Management and Security*'. Further information on the four topics is summarised as follows:

Topics	Remarks
(A) An Overview of Data Communications and Networking	
<ul style="list-style-type: none"> • Components of a network and types of communication links 	<ul style="list-style-type: none"> • Students should examine in detail the fundamental principles underpinning data communication and networking. They should be able to identify, explain and provide examples of the components (server/host, client, and circuit) for establishing a network. They should be able to explain the characteristics of the different types of communication links, such as modem dial-up, leased line, Integrated Services Digital Network (ISDN), etc.
<ul style="list-style-type: none"> • Communication protocols, mode of transmission and bandwidth 	<ul style="list-style-type: none"> • Students should know the needs of communication protocols, and be aware of the different modes of data transmission, such as serial and parallel, simplex and duplex, multiplexing, etc.
<ul style="list-style-type: none"> • Types of networks 	<ul style="list-style-type: none"> • Students should be able to describe the characteristics of different types of networks, including the Local Area Networks (LAN), Metropolitan Area Network (MAN) and Wide Area Network (WAN).
<ul style="list-style-type: none"> • Future trends of data communications & networking 	<ul style="list-style-type: none"> • Students should have sufficient discussion on the future trends of data communications and networking.
(B) The Internet	
<ul style="list-style-type: none"> • Development of the Internet, Internet addresses & Domain Name Systems (DNS), the basic principles of Transmission Control Protocol / Internet Protocol (TCP/IP) 	<ul style="list-style-type: none"> • Students should be able to give a brief account of the development of the Internet, explain the principles of DNS, what is TCP/IP and how it works.
<ul style="list-style-type: none"> • Tools and services available on the Internet 	<ul style="list-style-type: none"> • Students should be able to give examples on common applications available on the Internet (e.g. WWW, electronic mail, video conference, file transfer, telnet, etc.) and describe the general principles behind.
<ul style="list-style-type: none"> • Business on the Internet 	<ul style="list-style-type: none"> • Students should be aware of the common e-Commerce models and be able to describe general principles underlying the operation of electronic stores, electronic marketing, customer service sites, information and entertainment provision, etc.

Topics	Remarks
(C) Local Area Networks	
<ul style="list-style-type: none"> Basic concepts of a LAN 	<ul style="list-style-type: none"> Students should be able to describe the advantages of using a LAN. They should understand the differences between a client-server LAN with a peer-to-peer LAN. Students should understand the basic network topology such as star, ring and bus.
<ul style="list-style-type: none"> LAN components 	<ul style="list-style-type: none"> Students should be able to describe the name and functions of various components comprising a LAN, including the NIC, cables, hubs & switches, network operating system, etc.
<ul style="list-style-type: none"> Ethernet as a LAN example 	<ul style="list-style-type: none"> Students should be able to describe the technology, characteristics and development of the Ethernet LAN.
<ul style="list-style-type: none"> LAN performance 	<ul style="list-style-type: none"> Students should know that the performance of a LAN is affected by factors such as the server performance, circuit capacity, network traffic, technology adopted and networking operating system used. They should be given opportunities to explore issues related to the performance of LANs and to propose ways to improve it.
<ul style="list-style-type: none"> Connecting LANs to the Web 	<ul style="list-style-type: none"> Students should be aware of the different ways and components necessary for connecting a LAN to the Web.
<ul style="list-style-type: none"> Recent development of LAN technologies 	
(D) Network Design, Management & Security	
<ul style="list-style-type: none"> Need analysis, design and cost assessment, network configuration, documentation 	<ul style="list-style-type: none"> Students should be able to design a simple LAN for a particular purpose, justify the technology and configuration chosen, prepare a simple schematic diagram of a network and write up documents to record the specifications of the network.
<ul style="list-style-type: none"> Network monitoring and troubleshooting 	<ul style="list-style-type: none"> Students should have the experiences of performing troubleshooting and analysis of problems associated with the use of a networked environment.
<ul style="list-style-type: none"> End-user support and training issues 	<ul style="list-style-type: none"> Students should be given sufficient opportunities to discuss issues related to support and training.
<ul style="list-style-type: none"> Type of security threats, network control, preventing unauthorised access 	<ul style="list-style-type: none"> Students should be given sufficient opportunities to discuss issues related to network control, security, and unauthorised access.

Elective Module (D)

Algorithm and
Programming

Organisation
of Computer

Data Communications
and Networking

Multimedia
Production and Web
Authoring

Multimedia Production and Web Authoring

The elective **Multimedia Production and Web Authoring** is built upon a number of topics in the core module, including the **Information Processing and Presentation, Computer Systems and Networking**, as well as **Internet and its Applications**. Students are expected to have further understanding of multimedia production and web authoring. They should develop the required concepts through structured tasks, as in real life situation it is essential for the designer or developer to manage his/her own task efficiently. They should also develop their study and learning skills effectively in the elective, as new technologies will be emerging from time to time and there is a need for professionals in the field to cope with rapid changes.

Overall Expectations

In summary, students should be able to:

- Capture, create, process or optimise the different kinds of multimedia elements for presentation in different environments;
- Understand and apply the practical considerations for incorporating multimedia elements into a presentation;
- Understand and apply the design factors for presenting information effectively on the Internet;
- Use a web authoring tool and the associated web authoring skills effectively to present information and to collect information on the Internet, including a basic understanding of concepts related to the construction of dynamic web pages;
- Use the Hypertext Markup Language (HTML) in the construction or modification of web pages;
- Describe briefly the recent developments in the markup languages;
- Describe briefly the requirements for web hosting; and
- Use FTP programs and other appropriate tools to manage a web site.

The time allocation for the elective is about 30 hours.

Details of the Elective

The elective *Multimedia Production and Web Authoring* comprises three topics, namely '*Multimedia Production*', '*Design Factors for Presenting Information on the Internet*', as well as '*Web Authoring and Simple Web Management*'. Further information on the three topics is summarised as follows:

Topics	Remarks
(A) Multimedia Production	
<ul style="list-style-type: none"> • Use of <ol style="list-style-type: none"> 1. Text 2. Graphics 3. Audio Information 4. Animations 5. Videos 	<ul style="list-style-type: none"> • Students should understand basic concepts related to the different multimedia elements. They should be able to <ul style="list-style-type: none"> ➤ make a distinction among them (e.g. between bitmaps and vector graphics, between wave files and midi files, etc.); ➤ change the attributes according to given needs (e.g. the font size and typeface of text, the colour scheme of graphics, the amount of details for digital information, etc.); ➤ convert the same kind of multimedia elements from one file type to another; ➤ perform simple editing and processing (e.g. changing the sharpness and brightness of graphical images, applying filters to give special effects, performing simple editing and mixing of wave files, performing simple video editing, etc.). • Students should also be able to <ul style="list-style-type: none"> ➤ use scanners, digital cameras, or screen capture, etc. to capture digital images; ➤ construct simple vector graphics using a graphic utility; ➤ use features of a sound card to capture audio information; ➤ construct simple animation, such as the animated GIF and the Flash animation, using appropriate software.
<ul style="list-style-type: none"> • Common concepts among different multimedia elements 	<ul style="list-style-type: none"> • Students should be aware that common concepts like digitisation, compression, striking a balance between the file size and resolution, etc., exist among different multimedia elements.
(B) Design Factors for Presenting Information on the Internet	
<ul style="list-style-type: none"> • Planning and designing the file structure of the web site • Planning and designing the use of the workspace available on each page 	<p>Students should have sufficient exposure to planning and designing web pages for them to generate the required concepts.</p>
<ul style="list-style-type: none"> • Practical considerations in the construction of web pages 	<ul style="list-style-type: none"> • Students should be aware of the following practical considerations in the construction of web pages: <ul style="list-style-type: none"> ➤ Use of a colour scheme ➤ Grouping information into tables and lists

Topics	Remarks
• Catering for different users	<ul style="list-style-type: none"> ➤ Using frames ➤ Providing details in downloadable files or other pages ➤ Using meaningful contextual links ➤ Use graphics, audio files and animation appropriately ➤ Take into consideration differences in common browsers ➤ Date-stamping the documents ➤ Providing channels for feedback ➤ Structuring the contents for easy printing
	<ul style="list-style-type: none"> • Students should be aware that information on the Internet can be accessed through means other than a browser in a computer. • Students should be aware that relevant guidelines have been developed to cater for web accessibility by people with special needs.
<hr/> (C) Web Authoring and Simple Web Management	
• Basic understanding of web authoring tools	• Students should know that there are a variety of tools available for web authoring and note their differences. They are not required to have a complete understanding of all the functions available in these tools.
• Further understanding of markup languages	<ul style="list-style-type: none"> • Students should know that there are different markup languages developed for different purposes. They should also be aware of the recent developments in the markup languages. • Students should be able to apply an understanding of HTML to edit or perform fine-tuning of web pages.
• Presenting information using special constructs	<ul style="list-style-type: none"> • Students should be able to <ul style="list-style-type: none"> ➤ use lists and tables for presenting information; ➤ use frames to split up the workspace for presentation; ➤ embed multimedia elements for enriching the presentation; ➤ use links and anchors to link up information.
• Using Mailto and Fill-out Forms to collect information	• Students should be aware that there are a variety of ways to collect feedback. In order that feedback can be collected and responses can be given afterwards, there are programs and mechanisms in the server to process the information.
• Introduction to dynamic web pages	<ul style="list-style-type: none"> • Students should understand the meaning of web posting and web hosting, and have the experience of posting web pages with a tool such as a File Transfer Protocol (FTP) program. • Students should be aware that server-side computing is needed in dynamic web pages.
