

E238 INFORMATION SYSTEMS (YEAR 12)

- 2006-2007

Rationale

Information systems are an integral component of our social structure. This subject will help students analyse, design and develop information systems. Within this framework students will examine data communication, networks, hardware, software and the principles of programming. Information Systems provides students with a solid basis for further study in a wide range of disciplines.

The philosophy behind the programming concepts in this subject reflects the change away from making the computer do what we want to allowing the computer to interpret our solutions to problems.

General Aims

- To develop an awareness of information systems that affect our lives.
- To build an understanding of the role of technology in information systems.
- To develop an awareness of the impact of information technology.
- To develop an understanding of the moral and ethical dilemmas created through the application of information technology.
- To develop skills in the analysis and design of information systems.

Educational Objectives

By the end of the subject, the student should be able to:

- collect and process data using a computer system
- develop solutions to information-related problems
- demonstrate an understanding of the processes involved in designing and implementing a computerised information system
- recognise many of the social and organisational consequences of information systems and the need for the application of ethical standards
- demonstrate an understanding of the hardware supporting information systems
- demonstrate a working knowledge of the vocabulary associated with information systems.

Teaching - Learning Program

The following is a guide to the subject content and the minimum time to be allocated to each section. It should be used to determine the depth of treatment, but does not indicate the sequence in which the material is to be covered. The words 'define', 'describe' and 'apply' are used throughout each area of content to indicate the depth and breadth of treatment required.

The *Grade Related Descriptors* and *Suggested Standards for Information Systems*, both available from the Curriculum Council, should be used in conjunction with this syllabus.

In the teaching, learning and assessment of this subject, these terms are taken to mean:

Define: State the nature and essential attributes.

Describe: Explain the properties in a given context.

Apply: Put skills, concepts and knowledge to practical use in solving problems.

This guide is based upon 110 hours of instruction.

Information Systems (35 hours)

1. Define:
 - datum
 - data
 - information
 - system
2. Describe:
 - information systems
 - communications systems
3. Define:
 - carriers
 - service providers
4. Describe:
 - management information systems
 - computer systems
 - computer-based information systems
5. Describe:
 - centralised information systems
 - distributed information systems
6. Describe:
 - open information systems
 - closed information systems
7. Apply logical data flow diagrams.
8. Apply analysis techniques.
9. Apply design techniques including 'life cycle' and 'prototyping'.
10. Define and compare:
 - 'top down' design
 - 'bottom up' development
11. Define project management including:
 - teams
 - planning
 - progress reports
 - time management
 - work assignment (work breakdown structure)

Note: Students are expected to develop skills in the analysis and design of information systems in association with other sections of this subject.

Computer Architecture (10 hours)

1. Describe the fetch-execute cycle.
2. Describe the central processing unit (CPU) components in terms of the functions of:
 - control unit
 - registers
 - arithmetic/logic unit (ALU)
3. Describe the roles of buses.
4. Describe the concepts of caching.
5. Define:
 - reduced instruction set computer (RISC)
 - complex instruction set computer (CISC)
6. Describe:
 - sequential processing
 - parallel processing
 - distributed processing
7. Define:
 - firmware
 - software
8. Define levels of storage.
9. Describe the convergence and compatibility of computer architectures.
10. Describe trouble-shooting procedures.
11. Describe the role of preventive maintenance.

Note: Students are expected to be aware of underlying computer technology in the day-to-day use of computers in various applications.

Data Communications (15 hours)

Communications outside of the PC

1. Define carriers and human communications media including:
 - Public Switched Telephone Network (PSTN)
 - Integrated Services Digital Network (ISDN)
 - radio
 - television
 - cable television
 - interactive media

Transparent technology

1. Describe media including:
 - Data Terminal Equipment (DTE)
 - Data Communications Equipment (DCE)
 - modems
 - bandwidth
 - optical and electronic transmission media, including copper (coaxial, unshielded twisted pair, shielded twisted pair), microwave and laser
2. Describe the role and purpose of standards in achieving connectivity including:
 - RS232
 - ISO 802.3
 - X.25
3. Describe:
 - noise
 - attenuation

- error detection/correction standards

Networks

1. Define:
 - digital networks
 - ISDN
 - LAN
 - WAN
 - cellular networks
 - International Standards Organisation-Open Systems Interconnectivity (ISO-OSI)
2. Describe the difference between LAN and WAN.
3. Define common problems with network interconnections.
4. Describe the structure of the Internet.
5. Apply the facilities of the Internet to personal communications.
6. Apply an effective search strategy to locate required information on the Internet.
7. Define the role of clients and servers.
8. Define LAN topology.
9. Describe network hardware including:
 - hubs
 - routers
 - bridges
10. Define and compare:
 - distributed information processing
 - centralised information processing
11. Describe:
 - the importance of data security
 - data security techniques (including encryption)
 - how computer-based information systems can encroach upon an individual's privacy
 - application of ethics to the use of information resources

Note: Students are expected to be aware of communications technologies and their interaction, and be able to use network facilities to retrieve information.

Databases (25 hours)

1. Define file organisation for:
 - sequential files
 - random files
 - indexed sequential files (ISAM)
2. Apply relations, attributes, tuples, keys (primary and foreign) and indexing.
3. Describe normalisation to the Third Normal Form (3NF).
4. Describe:
 - data integrity
 - data redundancy
 - data duplication
5. Describe the role of the data dictionary in systems analysis, design and development.
6. Apply entity-relationship diagrams.

7. Define database models:

- flat-file
- hierarchical
- network
- relational

Note: Students are expected to develop skills in using a relational database and apply these skills to modify and to build simple computer-based information systems.

Languages (25 hours)

1. Define:
 - machine code
 - assembler languages
 - procedural languages
 - fourth generation languages (4GL)
2. Define and compare:
 - interpreters
 - compilers
3. Apply:
 - sequence
 - selection
 - iteration
4. Apply modular principles and simple parameter-passing.
5. Apply data structures, including simple arrays and records.
6. Apply Pseudocode and Nassi-Shneiderman diagrams to solve simple problems.
7. Apply programming to solve simple problems.

Note: Students are expected to understand these principles common to languages in a variety of contexts, rather than to learn a specific language.

Time Allocation

The subject has been designed to be completed through a structured education program of approximately 110 hours in any suitable contexts and series of learning experiences. Typically the subject will be studied over the period of one school year. For administrative reasons schools wishing to vary this delivery pattern (e.g. over a shorter period or over a longer period up to two school years) are required to notify the Chief Executive Officer, Curriculum Council.

Subject Completion

Students must complete the school's structured educational and assessment program for a subject in order to be eligible to receive a grade unless there are exceptional and justifiable circumstances. In situations where the school considers that insufficient information has been gathered to justify the award of a grade for the subject, a result of U (for unfinished) should be allocated. The Curriculum Council offers the flexibility for the U to be converted to a grade after the final grades have been submitted. Further details on assessment and grading are provided in Volume I of the Syllabus Manuals.

Facilities

Schools wishing to offer Information Systems should ensure that they possess the software (and hardware) to support this subject. Specifically the minimum software requirements may be classified as:

- word processor
- spreadsheet
- flat-file database
- relational database
- a programming environment capable of demonstrating sequence, selection, iteration, modules, parameters and data structures
- network access (including the Internet).

Examination Details

The examination will consist of one written paper of three hours duration. There will be three parts to the paper:

- Part A: multi-choice questions (15%)
- Part B: short answer questions (25%)
- Part C: extended answer questions (60%)

Resources:

Calculators satisfying the conditions set by the Curriculum Council for this subject, which are listed on the Curriculum Council website:

www.curriculum.wa.edu.au/pages/student/calculators.htm

Assessment Structure**Table 1**

Syllabus Content	Weighting percentage
Information systems	30-35
Computer architecture	5-10
Data communications	10-15
Databases	20-25
Languages	20-25

Table 2

Learning Outcomes	Weighting percentage
Knowledge	35-45
Process	15-25
Synthesis and evaluation	35-45

Table 3

Types of assessment	Weighting percentage
Tests and examinations	40-50
Individual assignments	35-45
System building projects	10-20

Grade-Related Descriptors

Grade-Related Descriptors describe the student performance standards that are used to award grades in this subject. Schools delivering this subject have been provided with a copy of the document. Additional copies may be purchased from the Curriculum Council.

Suggested Standards

Refer to the support document titled *Suggested Standards for Information Systems Tools*, available from the Curriculum Council.

Resources

Support Material

Support material for this subject can be ordered through the Curriculum Council Publications Catalogue and is available on the Curriculum Council website (<http://www.curriculum.wa.edu.au>).