AM SYLLABUS (2013)

INFORMATION TECHNOLOGY AM 19

SYLLABUS

Contents

Information Technology AM 19	(Available in September)
Syllabus	Paper I (3 hrs)+Paper II (3 hrs) + Coursework

Introduction

This course is meant to prepare students for business and computer-related courses as well as preparing students for work in industry in the information processing fields. In particular, it aims to:

- Provide a basic knowledge of computer hardware and software;
- Introduce the business areas to which computers may be applied;
- Provide an introduction to business organisation and information systems;
- Develop the skills in communication, verbal and written, which play an important part in business computing and information processing;
- Provide sufficient training in programming to enable the design, writing and documenting of a program or suite of programs in a high-level language;
- Provide sufficient training in basic web-design using generic authoring tools
- Provide sufficient training in database design and implementation using the relational data model
- Develop knowledge regarding the capabilities of generic software.

Course Structure

Prerequisites: It is recommended that students following this course have a SEC standard in computing. However this course does not assume such level.

Duration: A 2-year period of study is assumed with a total of approximately 350 contact hours, which include both lectures and lab work.

Content

The syllabus consists of five major modules:

1:   Information Systems
Aim: To give students a broad foundation of basic computing/data processing knowledge and skills.

2:   Human communication and Business Organisation
Aim: To give the student an understanding of the information needs of organisations, the various types of organisation and the various ways that Information Technology permeates within organisations. To provide students with the necessary written and verbal communication skills to enable them to relate to others on computing and non-computing matters within organizations

3:   Software
Aim: To become familiar with the various types of software categories and their capabilities.

4:   Programming Techniques and System Development
Aim: To give students knowledge of the necessary techniques needed to implement algorithmic design using a high level language, which is object-oriented (using Java), as well as creating, testing and maintaining systems. Students will develop skills to use, design and develop data-oriented software (e.g. forms, databases, generic applications and websites).

5:   Projects
Aim: To give students the opportunity to put into practice concepts learnt during the course. Projects are split into a number of phases (defined in the marksheets provided). Each phase should be completed by the students and signed-off by the tutor following a pre-determined schedule.

5.1 Database Project: The aim of this project is to allow students to apply the theory learnt throughout the course, and to appreciate the importance of database design for any information system. Knowledge of SQL and proper design techniques are expected for this project (covering all aspects set within the syllabus)

5.2 Programming Project: The aim of this project is to give students a firsthand experience on the design, development and testing of an information system.

5.3 Web Design Project: The aim of this project is to give students a good understanding of web-design. The task assigned will be in the form of a multi-page website.

Assessment Procedure

Modules 1 and 2 are assessed on the basis of ONE WRITTEN EXAMINATION PAPER AT THE END OF THE 2-YEAR COURSE.

Modules 3 and 4 are assessed on the basis of ONE WRITTEN EXAMINATION PAPER AT THE END OF THE 2-YEAR COURSE.

Module 5 is assessed on the basis of a set of 3 school-based exercises carried out by the candidate during the course of study, monitored and assessed by the tutor and moderated by the Markers' panel. All marks are to be submitted to MATSEC by not later than the date stipulated by the MATSEC support unit.

Note for Private candidates: Private Candidates are to submit all exercises to the MATSEC Support Unit, for assessment by the Markers Panel, by the date stipulated by the unit. Candidates may be called for an interview about their work.

Weightings for final Grade

		Module	% Weighting
Paper 1 (3 hours)	Section A	Information Systems	20
	Section B	Human Communication & Business Organisation	15
Paper 2 (3 hours)	Section A	Software	15
	Section B	Programming Techniques and System Development	20
Set Projects			30

Written Section
1) Students must obtain a satisfactory mark in the written component
2) Candidates can obtain a grade between A and C (inclusive) if they satisfy the examiner in the written component, irrespective of the total marks obtained.
   a. This will reflect the fact that the written component is a crucial part of the entire examination. This will test the candidate's theoretical knowledge, including material used in their projects.

Projects
1) Three compulsory projects will be set during the course. All three must be submitted for candidates to be able to get a passing grade. If any of the three projects is not presented, the candidate will not be eligible to get a grade between A and E.
   a. Candidates may re-submit any project/s in a successive session if they fail to satisfy the examiners in any one of the given projects in the first session.
2) All candidates may be called for an interview on their projects

3) Private candidates will be expected to present their lab-books. The project is to be carried out under the supervision of an Information Technology teacher who is currently teaching IT in one of the schools approved by MATSEC.

4) Weighting for each project
   a. Web Design Project 6%
   b. Database Project 10%
   c. Programming Project 14%

Three lab-books are to be presented at the end of the course, one for each assigned project
   a. The lab-book is to be organised following the template attached to this syllabus (Section 7). The front sheet (Section 6) is included in this document. An authentication form is required and is available for download from the Matsec website.
   b. At the completion of each phase, candidates are to present their lab-book to their tutors for correction and marking (as indicated within the marking scheme in section 6).
   c. It is up to the tutor to schedule the completion date of each phase
   d. Eventually the lab-book will represent a complete project (also referred to as the documentation).
   e. Candidates need to submit an authentication form, which is provided by Matsec.

Paper Structure

Paper 1

- Duration three hours
- Maximum mark 105
- This paper will consist of two sections:

Section A: Information Systems (maximum mark 60)
- Questions are set on the syllabus content of Module 1.
- Four questions are set.
- One compulsory question, consisting of short questions and carrying 20 marks.
- Three questions, to choose two, each carrying 20 marks.

Section B: Human Communication and Business Organisations (maximum mark 45)
- Questions are set on part of the syllabus content of Module 2.
- Four questions are set.
- One compulsory question, consisting of short questions and carrying 15 marks.
- Three questions, to choose two, each carrying 15 marks.

Paper 2

- Duration three hours.
- Maximum mark 105.
- This paper will consist of two sections:

Section A: Software (maximum mark 45)
- Questions are set on the syllabus content of Module 3.
- Four questions are set.
- One compulsory question, consisting of short questions and carrying 15 marks.
- Three questions, to choose two, each carrying 15 marks.

Section B: Programming Techniques and System Development (maximum mark 60)
- Questions are set on the syllabus content of Module 4 and on Project Material
- Four questions are set.
- Compulsory question on minimum requirements of the 3 projects (Java, DB and Web) carrying 20 marks. The compulsory question shall consist of three sections:
  - o 10 Marks for Java Project related questions
    - Code snippet of 15-20 lines (inline numbering for each line of code)
    - Questions of a simple nature, such as the following
      - Describe the algorithm between lines x and y
      - Give line numbers where methods are declared
      - Give line numbers where classes are declared
      - Identify mistakes in lines x to y
      - Find missing parts in lines x to y
      - Fill in missing parts
  - o 5 Marks for DB project related questions
    - SQL snippets or Entity Relationship Diagram
    - Questions of a simple nature, such as the following
      - What is the expected output of the code in lines x to y?
      - Find mistakes in code
      - Fill in the missing code
      - From the ER diagram given, write an SQL statement to output the following...
      - Underline Primary Keys
      - Draw an ERM from a given scenario

- o 5 Marks for Web project related questions
    - ▪ HTML or CSS snippets (as indicated in syllabus)
    - ▪ Questions of a simple nature, such as the following
        - Describe what tags on lines x,y and z mean
        - Turn text on line x as an ordered list
        - Make text on lines y a link pointing to URL *u*
        - Make text on line x a main header
- Three questions, to choose two, each carrying 20 marks.

Grading

The final grade will be based on an overall aggregate score and candidates must obtain a minimum mark in each paper to be established by the Markers Panel.

Re-sit

Candidates who fail to meet the criteria for a pass will have to re-sit the entire examination.
Project marks may be carried forward for subsequent sessions based on this syllabus.

1:   INFORMATION SYSTEMS

1.1 INFORMATION SYSTEMS IN ORGANISATIONS

By the end of this section candidates should be able to:

- Have a basic understanding of Information Systems (IS) and their role in organisations.
- Appreciate the need for organisations to update their information systems constantly; hence the concept of an information systems life cycle and the need for planning when developing an information system.
- Be aware of the issues related to implementing information systems in organisations.
- Define an expert system, its benefits and limitations.
- Understand issues pertinent to data and data capture.
- Define causes of data loss and understand the basic issues to be considered when setting up a disaster recovery plan.
- The main aspects relevant to implementation of ICT related legislation in organisations.
- The need for training in order to maximise the advantages brought by IS.
- Define project management and the role of a project manager in organisations.
- Understand the importance of codes of practice in organisations.

1.1.1	Role of Information systems in Organisations	1. Definition of Information Systems 2. Issues related to organisations and information systems. IS as a means of extracting the required information by the organisations. 3. Types of information systems found in organisations: data processing systems, knowledge work systems, and management information systems. Their main differences. 4. Internal and external information with respect to the organisation 5. Definition of Strategic, Tactical and Operation Information Systems
1.1.2	Information systems life cycles	1. Overview of the systems life cycle and the Waterfall model. 2. The issues that indicate the need for a new system. 3. Overview of main stages: feasibility study, requirements analysis, system design, implementation, methods of conversion, post-implementation review, system maintenance. 4. Overview of prototyping – a different lifecycle – benefits and pitfalls of prototyping. 5. Description of other software development methodologies including RAD and Spiral.
1.1.3	Implementation issues of IS in organisations	1. What goes on during implementation of IS. 2. Aspects of successful and non successful implementation.
1.1.4	Management Information Systems / Business Intelligence Software	1. Role of management information systems and how they help managers take decisions 2. Characteristics of a MIS and factors effecting the success or failure of a MIS. 3. Definition of data warehousing 4. Executive Information systems and the purpose of drill-down techniques 5. OLAP (Online Analytical Processing)

		6. Data mining 7. Artificial Neural Networks	
1.1.5	Expert systems	1. Definition of an expert system. 2. Usage of expert systems in specific industries; medicine, engineering and manufacturing. 3. Benefits and limitations of expert systems.	

1.1.6	Data and data capture	1. Methods commonly associated with data capture (large volumes of data)
		2. Uses, advantages and disadvantages of
		    a. Bar codes.
		    b. Magnetic stripe cards.
		    c. Radio Frequency Identifier (RFID).
		    d. Optical Mark Recognition (OMR).
		    e. Optical Character Recognition (OCR).
		    f. Magnetic-Ink Character Recognition (MICR).
		    g. Smart cards.
		    h. Keying in the data.
		3. Overview of Electronic Data Interchange (EDI) – used to link suppliers and retailers electronically for fast information exchange.	

1.1.7	Data loss and recovery methods	1. Defining negligence in an IS environment – effects of negligence. 2. Main stages in disaster planning and disaster recovery plan. 3. Overview of a security plan including physical security and software related security. 4. Criteria used to select a contingency plan.	
1.1.8	Training issues	1. The need for ICT related training in modern organisations 2. Skills updating. Training for senior management, middle management and staff – characteristics of each group, the use of ICT tools by each and potential problems encountered 3. Methods of training – computer based training, instructor led courses 4. Aspects of a corporate training strategy	
1.1.9	Project Management	1. Defining project management and its importance in modern organisations 2. Aspects of project planning and scheduling (setting of timescales, resources required, potential areas of slowdown in development). 3. Project reviews – ways to analyse progress and take corrective action if required. 4. Composition and characteristics of a good project team. 5. Selection and characteristics of a good project manager –tasks for which project manager is responsible.	
1.1.10	Codes of practice in organisations	1. Issues related to ethics and computing – factors that need to be considered in ethical decision-making. 2. Formal guidelines in the computing industry. 3. Codes of practice – employee code of conduct. 4. Use of informal guidelines to make ethical decisions.	

1.2 INFORMATION: THE TOOLS REQUIRED TO HANDLE IT

By the end of this section the student should be able to:
- Define the basic components of a computer system.
- Understand the basic characteristics of a typical microprocessor.
- Be aware of typical input devices currently in use.
- Be aware of typical storage devices currently in use.
- Be aware of typical output devices currently in use.
- Distinguish between the main processing modes in current use.
- Understand the importance of user interfaces for IS and the main types of user interfaces found today.
- Appreciate some basic aspects of human-computer interaction (HCI).
- Appreciate the fact that all data in computers is stored in binary format and that the most frequently used number bases are binary and hexadecimal.
- Demonstrate an understanding of the different data representations.
- Understand why various methods of representing numbers in a computer exist.
- Understand the issues related to data verification and data validation, relevant to IS.

1.2.1	Computer system	1. Outline of a computer system as consisting of various components (I/O, processor, main memory, auxiliary storage). Type of components may vary and depend on requirements.
		2. Main categories of computers currently in existence. Define the following with examples of typical area of use
		    a. Mainframes.
		    b. Supercomputers.
		    c. Servers.
		    d. Desktops.
		    e. Laptops.
		    f. Notebooks.
		    g. Netbooks.
		    h. Tablet PCs.
		    i. PDA/Smartphones.

1.2.2	The processing unit	1. Overview of a typical microprocessor (ALU, CU, registers, buses as channels through which the various components are linked). 2. Main types of RAM and ROM currently in use. 3. ASCII and UNICODE as a means to represent characters
1.2.3	Input devices	Brief overview of main input devices (no technical details required). Important to indicate the advantages and disadvantages of each and hence the environment in which they should be used.
1.2.4	Storage devices	1. Notion of primary and secondary storage. 2. The hard-drive as a magnetic storage device. What are the advantages and disadvantages of using it? 3. Main types of optical-based storage devices together with their advantages and disadvantages 4. Definition of flash-memory and solid state drives (SSD)
1.2.5	Output devices	Brief overview of main output devices (no technical details required). Advantages and disadvantages of each and areas of application of each.
1.2.6	Processing modes	Understand the principles of 1. Batch processing (e.g. Payroll at end of month) 2. Master files and transaction files. 3. Online processing (e.g. POS)

		4. Real-time processing (e.g. Airline ticketing system, aircraft autopilot system) For each of the above processing modes, explain the criteria upon which they would be chosen.

1.2.7	User interface and HCI in IS	1. Understanding the basic psychological factors that are needed to design good software.
		    a. Distinguishing between short term human memory and long term memory and their relevance on software design.
		    b. Text versus graphics – pros and cons.
		2. Define the main interface styles together with their advantages and disadvantages
		    a. Command Line Interface (CLI).
		    b. Graphical User Interface (GUI).
		3. User experience documentation may be found at
		    c. http://msdn.microsoft.com/en-us/library/bb328626.aspx
		    d. http://library.gnome.org/devel/hig-book/2.32/principles.html.en
		    e. http://developer.apple.com/
		4. Emerging technologies
		    a. E.g. Speech recognition and eye movement tracking.

1.2.8	Number base systems and number representation	1. Decimal (denary), binary and hexadecimal.
		2. Conversion from decimal to binary and vice-versa.
		3. Conversion from decimal to hexadecimal and vice-versa.
		4. Conversion from hexadecimal to binary and vice-versa using any method
		5. Simple Binary addition (adding up binary equivalent of 2 numbers)
		6. Signed and unsigned fixed point integer representation.
		7. Signed and unsigned fixed point real representation and binary fractions. With simple examples, up to 1/32
		8. 2's complement notation with an example
		9. Definition of
		    a. Floating point representation.
		    b. Normalisation.
		    c. Range.
		    d. Overflow.
		    e. Underflow.

1.2.9	Data validation and verification in IS	1. The importance of accuracy and validity of the data.
		2. Categories of common errors.
		3. Validation Checks to include
		    a. Presence check.
		    b. Format check.
		    c. Range check.
		    d. File look-up check.
		    e. Look-up list check.
		    f. Parity (Even and odd).
		    g. CRC (Definition only).
		4. Verification versus Validation.

1.3 INFORMATION POLICY, STRATEGY AND SYSTEMS

By the end of this section, the student should be able to:

- Understand the main issues related to information policy and strategy;
- Appreciate the main mechanisms used in security and backup policies;
- Understand the main issues relevant to security of data;
- Define the main issues relevant to network security;
- Understand some data communication modes and the need for standards in this regard;

1.3.1	Information policies and strategies	1. Defining the challenge of information management in modern organisations. 2. The value of information and date. Usage of information to obtain knowledge for the benefit of the organisation 3. Consistency of information with organisations' business priorities. 4. The concept of 'Garbage in – Garbage out' 5. Comparing/contrasting centralisation with decentralisation with respect to managing information across the organisation. 6. The different needs of different users and how these can be catered for.
1.3.2	Security mechanisms	1. Types of backup strategies – full backup, incremental backup 2. Different backup methods a. Standard data back-up procedure. b. RAID system. c. Grandfather-father-son. d. Onsite and offsite backups.
1.3.3	Security of data	1. Importance of data integrity. 2. Authentication vs. Authorization 3. Authentication technologies a. User ID/Password. b. Access cards (e.g. Near Field Communication - NFC). c. Biometrics (e.g. fingerprint, palm print, voice recognition and retina/iris scanning). 4. Authorization a. Electronic access control. b. Physical access control. c. Rights management. d. Permissions and Restrictions. 5. Securing against malicious attacks a. Physical (CCTV, alarms, access control, protection against theft and arson). b. Electronic (anti-viruses, spyware, firewalls, data encryption for stored data). 6. Communications security (e.g. data encryption to protect data in transit) 7. Disaster planning 8. Security vs. Usability a. The balancing act between additional security and its impact on users. b. Security policies (e.g. password strength policy) i. E.g. The requirement for highly complex passwords might lead users to write them down on a piece of paper.

		c. Balancing the above through the security policy.

1.3.4	Networks in organisations	1. Types of networks commonly used: LAN and WAN. Advantages and disadvantages of networks.
		2. Definition of PAN and MAN
		3. Common LAN topologies (Star, Ring, Bus, Mesh).
		4. Server-based vs. peer-to-peer networks.
		5. What is the Internet?
		6. Overview of Internet structure – mesh of interlinked networks
		7. Communications media used.
		     a. Wired
		         i. Fibre Optic.
		         ii. Twisted Pair.
		         iii. Coaxial.
		     b. Wireless
		         i. Microwave.
		         ii. Bluetooth.
		         iii. WLAN.
		8. Narrowband vs. Broadband technologies (e.g. DSL)
		9. The use of bridges and gateways to link different networks together.
		10. Overview of Synchronous and Asynchronous transmission.
		11. Factors affecting the rate of data transmission.
		     a. E.g. Interference and Noise.
		12. Overview of protocols as standards
		     a. HTTP, HTTPS, TCP/IP, FTP.
		13. Direction of transmission (simplex, half-duplex, full-duplex).
		14. Serial and parallel transmission.
		15. Telecommunications standards and protocols – ISO-OSI model.
		16. Definition of the Internet protocol (IP)
		17. Definition of cloud computing

2: HUMAN COMMUNICATION AND BUSINESS ORGANISATION

2.1 HUMAN COMMUNICATION

At the end of the module candidates should be able to:

- Describe the nature of communication;
- Understand different means of communication;
- Appreciate communication-related technologies, their basic functions and relative advantages;
- Appreciate the power of the Internet as a means of human communication;
- Understand the information structures used for dissemination of information internally and also externally;
- The need for user support in IS-based organisations and the basic elements of user support systems.

2.1.1	Introduction to Communication	1. What is communication? 2. The communication model. 3. Different types of communication: a. Verbal, written and visual. 4. How electronic communication is affecting business: a. Tele-working. b. Internet. (in brief as it will be covered in a later section). c. Video Conferencing. 5. E-Government a. Information about online government services.
2.1.2	Verbal communication	1. The advantages and disadvantages of verbal communication. 2. Related technologies – features and advantages a. Telephone. b. Mobile telephony. c. VoIP. d. Satellite telephony. e. Voice-mail.
2.1.3	Written communication	1. The advantages and disadvantages of written communication 2. The concept of written media: content, structure, style, layout. a. Examples: Letter, memos, reports, Curriculum vitae, minutes. 3. Related technologies – main features and advantages a. Word-processing. b. E-mail. c. Document systems (such as groupware and workflow systems). d. Blogs. e. Wikis. f. Microblogging. g. Social Networks.
2.1.4	Visual communication	1. The effects of visual communication a. Examples: Posters, wall charts, notice boards, photographs, films, slides and videos, presentations and visual aids.

		2. Related technologies – main features and advantages.
		    a. The traditional printing process – books, newspapers, journals.
		    b. Desktop publishing.
		    c. Digital Image Processing
		        i. Basic photo editing, to include: resizing, manipulating and compressing images (e.g. JPG, GIF) due to bandwidth considerations, stitching of images, red-eye removal and horizon straightening.
		    d. Facsimile machine.
		    e. Photocopier.
		    f. Television.
		    g. Presentations.
		    h. Online video/presentations.

2.1.5	The Internet as a Human Communication Medium	1. Description of Internet utilities that can be used as human communication tools:
		    a. Email.
		    b. Chatting.
		    c. Newsgroups.
		    d. Discussion Groups.
		    e. Web Conferencing.
		    h. Blogging.
		    i. Wikis.
		    j. Micro-blogging.
		    k. Social Networks.
		2. The student should know how one could use the above services in a business both in internal and external communications.
		
		3. Advantages and disadvantages of the internet as a communication tool.

2.1.6	Internal communication in an organisation	1. Structures for dissemination of information such as
		    a. Use of a knowledge base (e.g. Collaboration and internal wiki) to disseminate information.
		
		2. Upward Communication: Purpose and content of reports, suggestion scheme systems, interviews, communication from trade unions to management, staff development and appraisal. The usage of report skeletons before drafting reports.
		
		3. Downward Communication: Purpose, policies of communication, different methods that a company can use in order to communicate with employees (e.g. magazines, induction manual, annual reports, letter, notice board, pay envelope inserts, staff appraisals and email).
		
		4. Definition of
		    a. Lateral Communication.
		    b. Grapevine.

2.1.7	External communication in an organisation	1. Why does a company have to spread information to the outside world?
		    a. Suppliers (what info should they know).
		    b. Customers (present and future).
		    c. Public relations.
		
		2. Different methods used to spread information:
		    a. Newspaper.

		b. Letters to customers. c. Forum. d. User groups. e. Blogging. f. Social networking. All in the context of being used by organisations to improve communication with other parties, customers, suppliers, governmental Agencies and other entities
2.1.8	User support systems	1. The need for support within the organisation and to external customers. 2. Characteristics of a 'help desk' and help desk software that may be in use today. 3. Aspects of technical support. 4. Role of forums (technical and user forums), user booklets, newsletters, live-chat and support articles 5. Support over the Internet – online help. 6. The role of 'traditional' documentation such as manuals.

2.2 BUSINESS ORGANISATION

2.2.1 ORGANISATIONS

Upon successful completion of this module the students should be able to:

- Describe the different types of organisation in the public and private sector;
- Describe the fundamental characteristics of an organisation;
- Construct an organisational chart showing the various working relationships;
- Outline various functional areas within organisations;
- Understand the activities that take place in various departments;
- Understand how change can be managed.

2.2.1.1	Formation of organisations	1. What is an organisation? 2. Behavioural science; from Barter Trade to Modern Organisations; specialisation; profit/non-profit-making organisations.

2.2.1.2	Types of organisations	1. Economics systems - Mixed Economies.
		2. Organisations in the Private and Public Sectors: Definitions, advantages and disadvantages of:
		    a. Sole Trader.
		    b. Partnership.
		    c. Private (Ltd) and Public (Plc) Companies.
		    d. Co-operatives.
		    e. Public sector entities.

2.2.1.3	Characteristics of organisations	1. Essential components of organisations; 2. Open vs. Closed systems; 3. Formal vs. Informal organisations; 4. Authority, responsibility and delegation; 5. Centralised and Decentralised; 6. Decision-making management functions.
2.2.1.4	Organisational Structure	1. Departmentalisation a. By Function; by Product; by Location; by Project.

		2. The Organisational Chart a. Hierarchical, Horizontal and Matrix. 3. The role of the Chief Information Officer (CIO) and the Chief Security Officer (CSO)

2.2.1.5	Introduction to Functional Areas	1. Definitions of the various functional areas
		    a. Sales.
		    b. Finance.
		    c. Marketing.
		    d. Administration.
		    e. Human Resources.
		    f. Production.
		    g. Procurement/Purchasing.
		It is acknowledged that other areas do exist, and some of the areas mentioned above may also be integrated, particularly in smaller organizations
		2. Explain the work carried out by each function
		3. The duties and responsibilities of the personnel at various levels within each functional area.
		4. Developing an organisational chart

2.2.1.6	Managing Change	1. Factors leading to change; 2. Classical example is the introduction or development of an information system: this will result in change that must be managed. Factors could include re-skilling, attitude, organisational structure, employment pattern and conditions as well as internal procedures. 3. Overcoming resistance to change

2.2.2 THE ROLE OF INFORMATION AND ICT IN ORGANIZATIONS TODAY

By the end of this section the student should be able to:
- Clearly distinguish between data and information, and appreciate the relevance of information in modern organisations;
- Clearly understand computer-related crime and the counter-measures employed to combat such crime;
- Appreciate the need for data protection legislation;
- Have a basic understanding of how ICT is affecting various areas in modern society.
- Understand the methods that organisations may use to fulfil their information requirements;
- Discuss the need for, and describe, a corporate information security policy;
- Appreciate the need for organisations to have an IS strategy.

2.2.2.1	Data and Information	1. Definition of Data 2. Definition of Information 3. The input-process-output cycle – information obtained by processing of 'raw' data. 4. Direct and indirect sources of data. The importance of quality of data /information (i.e. up-to-date, accurate and complete). 5. The significance of data and information to modern organisations – ability to take effective decisions for the benefit of organisations (such as entering a new market and carrying out research into a promising area). 6. External and internal forms of data with respect to organisations. 7. Modern organisations and individuals are subjected to overexposure to data and information. The need to find

		only what is required, when it is required (Information Overload)
		 8. The notion of the Information Society – a society based on information and knowledge (knowledge workers)
		 9. The use of ICT to facilitate data organisation. Benefits and limitations of ICT systems.
		     a. The use of the internet as a search tool
		     b. Search engines and search techniques (such as the use of wildcards)
		     c. On-line libraries (e.g. electronic journals)
		     d. Use of forums

2.2.2.2	Computer-related crime	1. A society based on information is threatened by itself. Data/information has become vital to most organisations/individuals that they may seek illegal ways of obtaining it.
		 2. A new type of crime – computer based crime. Defining computer crime/computer misuse. Authorities were initially unprepared.
		 3. Categories of illegal practices –
		     a. Hacking.
		     b. Theft (money, data, etc).
		     c. Computer based fraud (phishing and fraudulent traders).
		     d. Malicious code – viruses.
		 4. The Internet as a means to perpetuate these crimes beyond physical borders.
		 5. Modern legislation has been introduced to combat computer/digital crime
		 6. Software copyright laws – main issues (illegal to make, use and transmit unauthorised copies to other users).
		 7. Definition of Plagiarism and contrast with piracy

2.2.2.3	Information security- risks and protection	1. Understand the need for a corporate information security policy and its role within an organisation. Factors could include prevention of misuse, detection, investigation, procedures, staff responsibilities, disciplinary procedures. 2. Describe the content of a corporate information security policy. 3. Main issues to be considered in a data protection policy in organisations
2.2.2.4	Data protection legislation	1. The need to protect individual privacy in lieu of the fact that an individual's personal details are relatively easier to access online than in previously used systems. 2. Principles of data protection and the data protection act (Malta). The use of gov.mt and DOI websites is encouraged. 3. Exemptions (e.g. due to national security reasons). 4. Defining a data subject (i.e. persons whose details are stored in some database). Their rights. 5. The role and duties of the Data Protection Registrar/Commissioner
2.2.2.5	ICT related legislation in organisations	1. Aspects of software copyright, licensing and having backup copies allowed (fair-use)
2.2.2.6	IS strategies within organizations	1. The issues that need to be taken into consideration when creating an IS strategy. 2. ICT to gain competitive advantage (by organisations).

2.2.2.7	ICT in the modern society	1. An awareness of the limited role of computing in the past and its much wider role today
		2. Typical examples of ICT use today would be*:
		   a. Tele-working.
		   b. The changing nature of work and employment resulting from ICT.
		   c. ICT and leisure – ICT related entertainment, 'chatting', booking of holidays, flights etc via use of ICT.
		   d. Use of ICT to air views/opinions/share resources.
		(*other topics such as e-commerce are listed individually and in more detail)

2.2.2.8	e-business	1. An overview of e-Business 2. History – Emergence of online shops and online advertising 3. Definition of Internet Commerce 4. Advantages to business and to customers 5. Disadvantages to business and to customer 6. Definition of business to business (B2B) 7. Definition of business to consumer (B2C) 8. Definition of e-Marketing 9. Definition of e-Markets (e.g. eBay) 10. Advantages of adopting Customer Relationship Management (CRM) 11. Pure vs. Partial e-Business

2.2.2.9	e-government	1. Overview of eServices
		   a. Admin to Admin (e.g. Inter-departmental data requests).
		   b. Admin to Business (e.g. e-Procurement).
		   c. Admin to Citizen (e.g. requesting birth certificate).
		2. Informational vs. Transactional e-Services (applications, payments, licenses)
		3. Definition of life events
		4. Use of portals (E.g. gov.mt)
		5. Definition of an Electronic Identity (and examples of usage)

2.2.2.10	e-learning	1. Definition of e-learning 2. Definitions of synchronous and asynchronous communication (with examples) 3. Definition of Learning Management Systems (e.g. Moodle) 4. Advantages and Disadvantages of e-Learning

2.2.2.11	ICT in Science and Engineering	1. Give an outline of the following:
		   a. Design tools – CAD.
		   b. Simulation – traffic, piloting (air and sea).
		   c. Data tracking systems, telemetry.
		   d. Geographic Information System (GIS).
		   e. Weather forecasting.
		   f. Statistical packages (e.g. SPSS).

2.2.2.12	Health and Safety	1. Computers and health – people are using ICT more than ever before and are hence exposed to hazards that were not common in the past 2. Stress, Repetitive Strain Injury (RSI), Eyestrain, Extremely Low Frequency (ELF) radiation. 3. The ergonomic environment – recommendations

		regarding the design of the ICT work environment
		4. Health and safety –
		    a. Ownership of workspace by employees.
		    b. Taking regular breaks from the working area.
		    c. Provision of the right furniture and equipment.
		5. The responsibilities of the employer.

3:   SOFTWARE

3.1 CATEGORIES OF SOFTWARE

At the end of this module, students should be able to:
- Distinguish between the major categories of software;
- Describe the functions of the basic components found in an operating system;
- Understand the notions of software capabilities with reference to upgradeability, ease of use and reliability;
- Evaluate a software package to assess its suitability.

3.1.1	Software categories	1. Main two categories are System Software and Application Software. 2. Definitions of each.
3.1.2	System Software	1. Types of a. Operating system. b. Utility programs such as antivirus, archivers (compression) and defragmenters. c. Translators (compilers, interpreters and assemblers). d. Monitoring software for both hardware and software. e. Communication software. 2. Candidates should know that several Operating systems contain most of the system software above. Candidates are expected to be familiar with the properties and capabilities of the various types of system software.
3.1.3	Application software	1. Types of: a. Specific. b. General purpose (generic). c. Application generators. d. Integrated and software suites. 2. Advantages and disadvantages of each type 3. The scenarios in which each type of software may be applied
3.1.4	Operating System (OS)	1. Purpose of OS. Candidates should know that the OS is software that controls all operations. 2. Components of OS. a. Kernel (supervisor or control program). b. Memory manager. c. Input/Output manager. d. Backing store manager. e. Resource allocation and scheduler. f. Accounting. g. Error handling. h. Security. 3. Interface between hardware and user. 4. Types of operating systems. a. Single program OS. b. Multitasking. c. Multiprogramming. d. Networked. 5. Command line interface and GUI 6. Candidates are expected to be to list several examples of operating systems (Windows, Linux, MAC OS etc...)

3.1.5	Software Capabilities.	1. Portability between programs 2. Portability between files 3. Upgrades compatibility 4. Object Linking and Embedding (OLE) and the differences between linked and embedded objects 5. Reliability tests

3.1.6	Software Evaluation	1. Evaluation criteria
		2. Some examples of criteria are
		    a. Hardware needs.
		    b. Quality of documentation.
		    c. Compatibility with existing software.
		    d. Ease of use and learning.
		    e. Technical support.
		    f. Cost.
		    g. Benchmark tests.
		    h. Software house reputation.
		    i. Evaluation report.
		3. Students should be able to write an evaluation report on one particular application package.

3.2 DATABASE SYSTEMS

At the end of this module, students should be able to:
- Describe the nature and purpose of database systems and how they work.
- Describe the function of tools readily available in database packages.
- Appreciate the advantages of relational database systems over traditional file systems.
- Describe the components of a database management system (DBMS).
- Generate structured query language (SQL) statements.
- Describe the different types of database organisation.
- Distinguish between shared and distributed databases.

3.2.1	Introduction	1) Filing systems
		    i) Manual filing systems (e.g. filing cabinets and card indexes)
		  b) Traditional file-based systems
		    i) E.g. Applications operating on isolated data.
		    ii) Limitations of flat-file approach
		      (1) Problem of data isolation.
		      (2) Problem of data duplication (redundancy).
		      (3) Problem of program/data dependence.
		1) Relational Database Systems
		  a) Advantages over traditional filing systems
		  b) Issues to be considered
		    i) Data consistency.
		    ii) Portability.
		    iii) Data redundancy.
		    iv) Security.
		    v) Complexity.
		    vi) Cost.
		    vii) Data size.
		    viii) Robustness.

3.2.2	Relational Data Model	1. Table (relation) organisation 2. Definition of entity 3. Definition of Field (attribute) 4. Definition of Key field (primary key) 5. Definition of Secondary key 6. Definition of Record (tuple).

		7. Links between tables (relationships)
		8. Definition of foreign key.
		9. Representation of relational tables by the use of the following notation
		a. The name of each table (relation) is followed by a list of all the fields in brackets.
		b. Key fields are underlined and foreign keys are in italic.
		c. Entity name in block capitals whereas field names are in lower case.
		10. Field types to be used in relational tables: text, numeric, date, Boolean and memo.
3.2.3	Database I/O	1. Inserting data in a database
		a. Using a GUI (e.g. Using Form builders).
		b. Using a query language (e.g. SQL statements).
		2. Extracting data from a database
		a. Using a GUI (e.g. Report builder).
		b. Using a query language (e.g. SQL statements).
3.2.4	DBMS	1) Definition of a database management system (DBMS)
		2) Definition and use of Data Dictionary
		3) Definition and use of File Manager
		4) Definition of Data Description Language (CREATE, ALTER and DROP)
		5) Definition of Data Manipulation Language (INSERT, UPDATE and DELETE)
		6) Definition of Data Query Language
		7) Definition of Views
		8) Role of Database Administrator (DBA)
		9) Security (Access Rights)
		10) The three level schema
		a) Conceptual.
		b) Logical.
		c) Physical.
3.2.5	Conceptual model	1. Design of the conceptual model, irrespective of DBMS type to be used.
		2. Entities, attributes and relationships
		3. Entity-Relationship (E-R) diagrams.
		4. Cardinality
		a. One-to-one.
		b. One-to-many.
		c. Many-to-many.
3.2.6	Normalisation	1. Purpose of normalisation.
		2. 1st, 2nd and 3rd normal form
3.2.7	Structured Query Language	1. Querying a relational data base by using SQL statements. SQL constructs: SELECT… FROM…WHERE, SELECT… FROM…WHERE…AND, SELECT… FROM…WHERE…ORDER BY…, SELECT… FROM…WHERE…GROUP BY… During the examination, students may be asked to create SQL statements from the constructs above.
3.2.8	Other data models	1. Definition and major characteristics of the following data models:

		a. Flat file. b. Relational. c. Hierarchical. d. Network. e. Object Oriented.
3.2.9	Centralized and Distributed database systems	1. Definition of each 2. Characteristics of each and usage examples 3. Relative advantages and disadvantages.

3.3 INTERNET-RELATED SOFTWARE

At the end of this module, candidates should be able to:

- Describe Internet-related terms;
- Describe the capabilities of Internet-related client applications;
- Try most of the Internet utilities listed below;
- Appreciate that all Internet applications and utilities run on top of standard protocols;
- Appreciate existence of software to improve security.
- Understand basic HTML principles

3.3.1	Introduction to the Internet	1. How the Internet was developed. 2. Internet structure 3. Internet registries 4. Domain names 5. DNS and TLD 6. Intranets and Extranets.

3.3.2	Basics of HTML, CSS and Javascript	1) Basics of HTML
		   a) Definition of HTML as a mark-up language
		   b) Basic examples of generic tags
		      i) <html>
		      ii) <body>
		      iii) <div>
		      iv) <p>
		      v) <h1>, <h2>, <h3>
		      vi) <a> (internal/external/anchors/mailto)
		      vii) Lists <ul> and
		      viii)<img>
		   c) Linking 2 pages using <a>
		2) Basics of CSS
		   a) Definition of CSS
		   b) External CSS files
		      i) <link rel="stylesheet" type="text/css" href="styles.css" />
		   c) Basic formatting example
		      i) Styles
		         (1) color
		         (2) text-align
		         (3) font-family:
		         (4) text-decoration
		      ii) Formatting
		         (1) Headers
		         (2) Paragraphs
		         (3) Lists
		3) Definition of Javascript
		   a) Form validation (required field, field length, email format)
		4) Sitemap

3.3.3	WWW	1) Definition of
		   a) Internet service provider.
		   b) Web site.
		   c) Web page construction.
		   d) Web server.
		   e) Web browser (URL, Bookmark and History).

3.3.4	Internet protocols	1) Purpose and definition of

		a) SMTP b) POP and IMAP c) FTP d) HTTP e) TCP/IP	

3.3.5	Internet client applications	2) Internet is not just the WWW. Other utilities are:
		   a) E-mail (e.g. Mozilla Thunderbird).
		   b) FTP (e.g. Filezilla).
		   c) Groups (e.g. Google/Yahoo groups).
		   d) Video conferencing.
		   e) RSS (E.g. Reading feeds from clients such as MS Outlook).
		   f) Amalgamated services (e.g. Google Talk, Windows Live Messenger, Yahoo Messenger, Skype).
		3) Students are expected to describe the purpose, features, advantages and disadvantages of each software utility
		4) Awareness of mobility
		   a) Connecting to the Internet via mobile phone.
		   b) Advantages and disadvantages.	

3.3.6	Internet Security problems	1) Internet based fraud (e.g. phishing, password hacking, brute force attacks, social engineering)
		2) Malware
		   a) Worms.
		   b) Viruses.
		   c) Key loggers.
		3) Some solutions to these problems
		   a) Encryption.
		   b) Firewalls.
		   c) Antivirus software.
		   d) Digital Signatures and Certificates.	

4: PROGRAMMING TECHNIQUES AND SYSTEM DEVELOPMENT

After covering this module, students should be able to demonstrate problem solving skills which can easily be applied to programming. Students should have experienced programming and testing techniques by using JAVA.

4.1 PROGRAMMING TECHNIQUES

At the end of this module, candidates should be able to:

- Describe the different generations of programming languages;
- Distinguish between programming paradigms with special reference to imperative and object-oriented;
- Describe the major features and be familiar with the constructs of an object oriented high level programming language (Java)
- Build well designed programs using structured techniques with an objected oriented type of programming language;
- Implement algorithms in problem solving;
- Use debugging facilities within an Integrated Development Environment.

4.1.1	Generations of Programming languages	1) Natural versus formal languages. 2) Definition of a) Machine language. b) Assembly language. c) High-level languages. d) 4GLs. 3) Purpose of language translators. 4) Features of compilers, interpreters and assemblers.
4.1.2	Programming paradigms	1) Major characteristics and areas of application of: a) Imperative programming. b) Functional programming. c) Declarative programming. d) Object-oriented programming. 2) Emphasis will be given to the object-oriented programming paradigm with Java as the reference language
4.1.3	Foundations of Programming	1) Definition and examples of : a) Character set. b) Reserved words. c) Identifiers (both standard and user-defined). d) Variables. e) Constants. f) Simple and structured data types (such as integer, floating, string and records). g) String functions (substring(), charAt(), compareTo(), concat(), contains(), startsWith(), endsWith(), indexOf(), length(), replace(), toLowerCase() and toUpperCase()). h) Statements. i) Logical expressions. j) Control structures (sequence, loops and branching). k) Switch statement. l) Subroutines (known as methods in Java).

		m) Parameter passing (with particular attention to Java's handling of primitive types and objects BY VALUE). n) Scope of variables. o) One and two dimensional arrays. p) File handling operations (binary files and serialization). q) Branching Statements (break, continue, return). r) Exception handling (Try and Catch blocks). s) Techniques for expressing sequence, selection and iteration constructs.
4.1.4	Structured programming techniques	1) Modularity; 2) Advantages of building programs using structured techniques
4.1.5	Object oriented paradigm	1) What is a Class? 2) Defining a class (with examples) 3) Defining class Properties and Behaviour 4) Constructors (default and custom) 5) What is an Object? 6) Creating objects (with examples) 7) Using the 'this' keyword 8) NULLifyng an object 9) Overloading Methods 10) Static variables and methods 11) Access modifiers 12) Concepts a) Abstraction and Encapsulation. b) Inheritance (Hierarchy). c) Polymorphism. 13) Method Overriding 14) Definition of packages and interfaces with examples
4.1.6	Problem solving techniques	1) Students should be highly encouraged to write algorithms before writing computer programs. 2) Algorithms for creation, initialisation, filling and displaying contents of one-dimensional and two-dimensional arrays. 3) Search algorithms (linear and binary) 4) Sorting algorithms (bubble sort). 5) Validation checks algorithms (range & data types). 6) Definition of different file organisations (serial, sequential, direct, indexed-sequential) 7) Operations on files (Creating, writing to and reading from binary files) 8) Questions assuming a particular high level language syntax will not be set, but candidates are expected to express the solution for given tasks in pseudo code.
4.1.7	Error types & Debugging	1) Candidates are expected to be familiar with the various debugging utilities found in an integrated development environment. 2) Program error types – syntax, logical, run-time. 3) Facilities such as trace, identifier evaluation and breakpoints.

4.2 SYSTEM DEVELOPMENT

By the end of this module, students should be able to:
- Plan a time schedule to complete system objectives;
- Investigate client requirements and set objectives during the design phase;
- Use structured techniques involved in system design;
- Implement and test the designed subtasks by means of software tools and/or good programming techniques;
- Produce the final documentation of the system being developed.

4.2.1	Planning	1) Before a system starts taking shape it must go through a number of development stages each of which must be well planned. Candidate learns how to plan a time schedule keeping in mind that all objectives are to be realistically chosen and achieved in the time frame available 2) This section is to be based on the waterfall model
4.2.2	Analysis Problem Identification and Investigation	1) Problem must be completely understood before solving it systematically. 2) Candidates are expected to practise methods for collecting information such as interviews, questionnaires, observations and inspection of documents.
4.2.3	Feasibility Study	1) Candidates are expected to practise writing feasibility study reports based on the outcomes of the investigation. 2) TELOS: Technical, Economic, Legal, Operational and Social aspects should be considered
4.2.4	System and information requirements	1) Input and output formats. 2) System type such as single/multi user, on-line, batch or real-time. 3) Storage requirements. 4) User interface needs. 5) Representation of data flow within the present system. 6) Creation of Data Flow Diagrams (DFDs). 7) Processing requirements. 8) Proposal of alternative methods of solution
4.2.5	Design	1) A solution is chosen from the alternatives defined in the previous phase. Reasons of choice are to be documented. Criteria considered could be costs, needs for development, knowledge and time frame available. 2) A suitable paradigm for implementation of software should also be selected. 3) Selection of existing software tools. 4) Structured techniques. Top-down and bottom-up approaches. 5) UML Models a) Class Diagram b) Use Case Diagram 6) The purpose of each module. Input/output interface of each module. 7) Database Requirements (Entity-Relationship Diagrams, Normalised tables) 8) Data structures and file organisations.

		9)	Choice of data types.
		10)	Description of algorithms in each module. Pseudo-coding.
		11)	Human Communication Interface. Input and output formats.
		12)	Data capture and validation methods.
		13)	Flowcharts
		14)	Description of testing strategy for individual components and for testing overall system (dry run, unit testing, integration testing, test data and expected outcome, black box and white box testing).
4.2.6	Implementation and testing	1)	Mapping of designed modules into a programming paradigm or application generation tool.
		2)	Actual testing is carried out according to chosen testing strategy.
		3)	System testing (alpha and beta testing, acceptance testing).
		4)	System implementation method (parallel, direct, pilot or phased).
		5)	Staff training.
		6)	Conversion of data files.
		7)	User's guide and technical documentations.
4.2.7	Maintenance	1)	What makes a system easy to maintain? This can include:
			a) Technical documentation.
			b) Modularity.
			c) Structured programming techniques.
		2)	Issues with maintenance if system is badly designed/documented
4.2.8	System evaluation	2)	System evaluation based on
			a) Usability.
			b) Effectiveness.
			c) Maintainability.

5:   EXERCISES

5.1 GUIDELINES ON EXERCISES

Problems chosen by students should be realistic and reasonable in the sense that the objectives planned may be implemented in the time-frame available. Candidates should be encouraged to use different sources of information – books, Internet, newspapers and journals.

In marking the assignments, credit will be given to the inclusion of the appropriate features as described in the following sections. All the required templates for projects are provided within this document (including front-page and document structure).

5.2 GENERIC SOFTWARE

This section will equip students with a better foundation for the delivery of higher quality projects.

- Become conversant with the nature and capabilities of the most common generic software;
- Improve their development skills by using generic packages namely word-processing, spreadsheet and   database.

5.2.1	Word processing (not examinable)	1. Page layout 2. Formatting 3. Spell and grammar checkers 4. Styles and proper formatting (Header levels) 5. Automated Index and Table of Contents creation 6. Template creation
5.2.2	Spreadsheet (not examinable)	1. Creation of charts and graphs 2. Pivot tables
5.2.3	Database	1. Creation of well organised and linked relational tables 2. Field data types: numeric, string, Boolean and date 3. Enforcement of referential integrity. 4. Queries 5. Forms and Reports 6. Use of macros 7. Creation of customised menus 8. Execution of multi-table queries.

The operation and use of particular generic software will not be assessed. However, examination questions will assume a reasonable level of knowledge and understanding of the capabilities of database, word-processing and specific reporting aspects of spreadsheets.

5.3 DATABASE PROJECT

Database Project Structure	Mark
System analysis and problem formulation	10
Problem Definition [200 to 300 words]	7
Scope (what you will be tackling in the project) [100 to 200 words]	3
Client Requirements	15
Background of the problem	5
Detailed requirements list	5
Possible Solutions	5
Database Design	20
Selected Solution	3
Entity Relationship Diagrams	5
Normalization	2
Design of data Validation rules	3
Field types well chosen and explained (including default values)	2
Test Plans (Including black-box testing and requirements coverage) *Black-box test-plan is to include the following fields in a tabular layout: Test Case no, Description, Expected Outcome, Actual Outcome (to be used later on) and Comments. Normal, abnormal and extreme test data is to be included. Requirements coverage should include a checklist of all the requirements agreed upon with the client. Actual coverage of such requirements will be checked at a later phase.*	5
Implementation	20
Creation of tables	5
Creation and use of forms for data entry	5
Queries on multiple tables (minimum of four)	4
Creation and display of reports	2
Use of macros	1
Creation of switchboard	1
Use of Pivot Table and charts for reporting	2
Testing	10
Implementation of test plan (and test results)	7
Screen shots of forms, reports and all modules	3
Evaluation of Complete System	5
System evaluation (what was implemented vs. scope of project)	2
Future enhancements	2
Skills acquired	1
Quality Assurance: Overall Objectives and Quality of Project	20
Minimum of three tables	3
Minimum of two relations	3
Indication of Primary and Foreign Key	2
Minimum of one form per table	1
Minimum of one form with sub form	1
Well-structured and user friendly interface	1
Minimum of three reports with different groupings with their relative totals or other group	2
Data for reports should be extracted from Queries with at least one join	2
Overall presentation and layout of documentation which must include: *Table of Contents, Header and footer, page numbering, good use of fonts and styles, images inserted within margins. Reference list using APA citation style.*	5

This project has no close relation with any commercial or free office automation suite.

5.4 PROGRAMMING PROJECT

Java Programming Project	Mark
System analysis and problem formulation	**10**
Problem Definition [200 to 300 words]	7
Scope (what you will be tackling in the project) [100 to 200 words]	3
Client Requirements	**15**
Background of the problem	5
Detailed requirements list	5
Possible Solutions	5
Selection and Solution Design	**20**
Selected Solution [200-300 words]	3
Class Diagram	5

Use Case Diagram
- Including
    o Creation of file
    o Creating and saving objects (entities)
    o Retrieving objects from file
    o Searching for instances and
    o Deleting instances
	5

Pseudo code for selected use cases (minimum two)	2
Test Plans (Including black-box testing and requirements coverage) *Black-box test-plan is to include the following fields in a tabular layout: Test Case no, Description, Expected Outcome, Actual Outcome (to be used later on) and Comments. Normal, abnormal and extreme test data is to be included. Requirements coverage should include a checklist of all the requirements agreed upon with the client. Actual coverage of such requirements will be checked at a later phase.*	5
Implementation	**20**
Variables and user defined types (with easy to read names)	1
Menu structure (using switch)	2
Data validation mechanisms (including file exists checks and input validity checks)	1
Use of Arraylist and/or Vector	1
Sorting algorithm	3
Search algorithm	3
Correct and appropriate parameter passing	1
Use of getter/setter methods in classes (accessors/mutators)	2
Input/Output operations on binary files (serialisation)	3
In-line documentation (comments)	1
Exception handling	2
Testing	**10**
Implementation of test plan (and test results)	7
Screen shots of various screens under test	3
Evaluation of Complete System	**5**
System evaluation (what was implemented vs. scope of project)	2
Future enhancements	2
Skills acquired	1
Appendix	**5**
Well structure user manual with step by step instructions (and guiding pictures)	3
Code listing (organised by class types)	2
Quality Assurance: Overall Objectives and Quality of Project	**15**
Minimum of two classes	2
Properly indented code	1

Appropriate and easy to read variable and type names (CamelCase notation)	1
Use of correct variable types	1
Proper use of encapsulation	1
Appropriate modular design within classes	1
Easy to use interface	1
Inline documentation	1
Appropriate user navigation mechanisms (menus)	1
Overall presentation and layout of documentation which must include: *Table of Contents, Header and footer, page numbering, good use of fonts and styles, images inserted within margins. Reference list using APA citation style.*	5

The use of an IDE (such as Eclipse) is encouraged and GUIs may be drawn using a GUI builder

5.5 WEB DESIGN PROJECT

Web Design Project	Mark
System analysis and problem formulation	**10**
Problem Definition [200 to 300 words]	7
Scope (what you will be tackling in the project) [100 to 200 words]	3
Client Requirements	**15**
Background of the problem	5
Detailed requirements list	5
Possible Solutions	5
Selection and Solution Design	**20**
Advantages of the website to the company [200-300 words)	2
Site-map (Organigram)	5
Draft design showing basic know-how of common design principles (e.g. location of logo and menu, colour scheme, use of proper fonts and sizes, accessibility and readability). All iterations of 'pen and paper' or software-based designs are to be submitted.	5
Bandwidth considerations (e.g. BMP vs. JPG images, size of files)	3
Test Plans (Including black-box testing and requirements coverage) *Planning for: Visual Tests (e.g. resizing issues and resolution), Cross-browser Compatibility and Requirements Coverage*	5
Implementation	**20**
Use of layers (DIVs)	2
Five different pages. Must include Home page, Contact us page, Legal Terms and a minimum of two other pages.	5
Page title (relevant to every page)	1
Meta tags (Author, keywords and description)	1
One external stylesheet (CSS) linked within all pages	2
'Contact us' with appropriate field validation in Javascript (e.g. required name and surname, required email using correct format and required comments field)	3
Tables for tabular data	1
Hyperlinks (Internal links and anchors)	1
Hyperlinks (External)	1
Mail-To facility	1
Use of images with alternate text (All sources should be acknowledged in documentation)	1
Page footer with links to 'Contact us' and 'Legal Terms' pages (e.g. Data Protection Note, Privacy Policy and Disclaimer) together with Copyright notice and date.	1
Testing	**10**
Implementation of test plan (and test results)	7
Screen shots of pages	3
Evaluation of Complete System	**5**
System evaluation (what was implemented vs. scope of project)	2
Future enhancements	2
Skills acquired	1
Quality Assurance: Overall Objectives and Quality of Project	**20**
Test under HTML validator: http://validator.w3.org (100% validation is not required)	4
Test under CSS validator: http://jigsaw.w3.org/css-validator (100% validation is not required)	3
CSS and Javascript saved in a separate file and linked to pages	1
Printouts in at least two different browsers (e.g. IE 7+, Firefox, Chrome and Safari)	1

All links must be functional	1
Proper folder structure is to be used (e.g. images in different folder than pages)	1
Works without horizontal scrolling in 1024x768	1
Images are not resized using HTML, but properly resized using a photo editor	2
Legibility (contrast between text and background, text size and font considerations)	1
Overall presentation and layout of documentation which must include: *Table of Contents, Header and footer, page numbering, good use of fonts and styles, images inserted within margins.* *Reference list using APA citation style.*	5

Any text editor or web authoring tool may be used, however content management systems (CMSs) cannot be used.

6. PROJECT FRONT-PAGE TEMPLATE

Student Name

I.D.

Name of School

University of Malta
L-Universita' ta' Malta
MATSEC Examinations Board

[E.g.] 2013
AM 19: Information Technology (Advanced Level)

[E.g. Programming] Project

7. LAB BOOK TEMPLATE

Each project will be submitted in the form of a lab-book, which is built incrementally according to the phases listed for each project. The following is the overall structure expected. Each section from chapters 4 till 9 need to be signed and marked at each stage.

1. Front Page (See Chapter 6)	
	o Student Name
	o Student ID
	o Name of School
	o Submission Date
	o Subject Code and Name
	o Project Type (e.g. Programming Project)
2. Authentication Form	
	o Provided by Matsec and is to be filled before submitting project
3. Table of Contents	
4. System Analysis and Problem Investigation	
5. Client Requirements	
6. System Design	
7. System Implementation	
8. Testing	
9. Conclusion and Evaluation	
10. References (APA)	

8. BOOKS AND REFERENCE LIST

The following books may be used as textbooks and/or as reference books. Apart from the list below, tutors are encouraged to supplement their courses with publications and resources from various academic and technical sources. This will ensure that the course content is updated and well balanced.

OOP and Java

- Sierra, K; Bates, B. Head First Java, 2nd Edition, O'Reilly Media, 2009, ISBN-13: 978-0596009205

Database Concepts and DBMS

- Oppel, Andy. Databases DeMYSTiFieD, 2nd Edition, McGraw-Hill Osborne Media, 2010. ISBN-13: 978-0071747998

ICT

- Alter, Steven. Information Systems: Foundation of E-Business (4th Edition), Prentice Hall, 2002. ISBN-13: 978-0130617736

- Gardner, Alan; Lyon, Carl. Oxford Revision Guides: AS & A Level ICT Through Diagrams, Oxford: OUP, 2009, ISBN-13: 978-0-19-918093-6

- Doyle, Stephen. Essential ICT A Level: Essential ICT for WJEC AS Level (Essential ICT), Oxford: OUP, 2008, ISBN: 1850084130

- Snyder, Lawrence. Fluency with Information Technology: Skills, Concepts, and Capabilities (4th Edition), Prentice Hall; 4 edition, 11 Feb 2010. ISBN-13: 978-0136091820

- Williams, Brian. K., Sawyer, Stacey. Using Information Technology, McGraw-Hill Higher Education; 8th edition, 1 Feb 2009, ISBN-13: 978-0073516752

- Rainer, Kelly R., Turban, Efraim. Introduction to Information Systems: Supporting and Transforming Business, John Wiley & Sons; 2nd Edition edition (30 July 2008), ISBN-13: 978-0470169001

- 'A' Level Computing (4th ed), by P.M. Heathcote (2000), Payne-Gallway Publishers Ltd, ISBN 1-903112-21-4

- The Complete A-Z ICT & Computing Handbook, by Bob Penrose and Bill Pollard, Hodder & Stoughton Ltd, ISBN 0-340-80277-4

- Understanding Computer Science for Advanced Level, (4th ed) by Ray Bradley, Stanley Thornes Ltd, ISBN 0-7487-4046-5

- 'A' Level ICT by Pam M. Heathcote, Payne-Gallway, ISBN 978-1904467137