Unit 1: Information Technology Systems

Level: **3**

Unit type: **External**

Guided learning hours: **120**

Unit in brief

Learners study the role of computer systems and the implications of their use in personal and professional situations.

Unit introduction

Information technology (IT) systems have a significant role in the world around us and play a part in almost everything we do. Having a sound understanding of how to effectively select and use appropriate IT systems will benefit you personally and professionally.

You will explore the relationships between the hardware and software that form an IT system, and the way that systems work individually and together, as well as the relationship between the user and the system. You will examine issues related to the use of IT systems and the impact that they have on organisations and individuals. To complete the assessment task within this unit, you will need to draw on your learning from across your programme.

This unit will give you a fundamental and synoptic understanding of all areas of IT, supporting your progression to an IT-related higher education course.

Summary of assessment

This unit is externally assessed through a written examination set and marked by Pearson.

The examination is two hours in length. Learners will be assessed on their understanding of computer systems and the implications of their use in personal and professional situations.

The number of marks for the unit is 90.

The assessment availability is January and May/June each year. The first assessment availability is May/June 2017.

Sample assessment materials will be available to help centres prepare learners for assessment.

Assessment outcomes

AO1 Demonstrate knowledge and understanding of information technology terms, standards, concepts and processes

Command words: complete, draw, give, identify, name, state

Marks: ranges from 1 to 6 marks

AO2 Apply knowledge and understanding of information technology terms, standards, concepts and processes

Command words: calculate, complete, demonstrate, describe, draw, explain, produce

Marks: ranges from 1 to 10 marks

AO3 Select and use information technologies and procedures to explore likely outcomes and find solutions to problems in context

Command words: calculate, demonstrate, develop, explain, produce

Marks: ranges from 1 to 6 marks

AO4 Analyse and evaluate information, technologies and procedures in order to recommend and justify solutions to IT problems

Command words: analyse, demonstrate, discuss, produce, write

Marks: ranges from 6 to 12 marks

AO5 Make connections between the application of technologies, procedures, outcomes and solutions to resolve IT problems

Command words: evaluate, produce, write

Marks: ranges from 6 to 12 marks

Essential content

The essential content is set out under content areas. Learners must cover all specified content before the assessment.

A Digital devices in IT systems

The concepts and implications of the use of, and relationships among, the devices that form IT systems.

A1 Digital devices, their functions and use

The features and uses of digital devices in IT systems to meet the needs of individuals and organisations.

- Digital devices that form part or all of IT systems:
  - multifunctional devices
  - personal computers
  - mobile devices
  - servers
  - entertainment systems
  - digital cameras – still, video
  - navigation systems
  - data capture and collection systems
  - communication devices and systems.
- The function and use of digital devices for:
  - education and training
  - personal
  - social
  - retail
  - organisational use – business operations, internal and external dissemination of information
  - creative tasks.

A2 Peripheral devices and media

The features and uses of peripheral devices and media in IT systems to meet the needs of individuals and organisations.

- Peripheral devices used with other digital devices to form part of an IT system:
  - input devices
  - output devices
  - storage devices.
- Manual and automatic data processing.
- Accessibility devices.
- Characteristics and implications of storage media used to form part of an IT system.

A3 Computer software in an IT system

The concepts and implications of the use of, and relationships between, hardware and software that form large- and small-scale IT systems and their impact on individuals and organisations.

- Types of operating system:
  - real-time operating system
  - single-user single task
  - single-user multi-tasking
  - multi-user.

- The role of the operating system in managing:
  - networking
  - security
  - memory management
  - multi-tasking
  - device drivers.
- Factors affecting the choice and use of user interfaces:
  - graphical
  - command line
  - menu based
  - adapted.
- Factors affecting the choice of operating system.
- Factors affecting use and performance of an operating system.
- Utility software:
  - the purpose, features and uses of utility software
  - factors affecting the choice, use and performance of utility software.
- Application software:
  - the purpose, features and uses of application software
  - factors affecting the choice, use and performance of application software.
- The principles and implications of open source and proprietary operating systems and software.
- The impact and features of user interfaces in computer software.
- The features of common file types and formats used for:
  - images
  - videos
  - application software.
- The implications on IT systems, individuals and organisations of the use and selection of file types and formats.

A4 Emerging technologies

How emerging technologies can be used by individuals and organisations.

- The concepts and implications of how emerging technologies affect the performance of IT systems.
- Implications of emerging technologies on the personal use of IT systems.
- Implications of emerging technologies on the use of IT systems in organisations.

A5 Choosing IT systems

How the features of an IT system can affect its performance and/or the performance of a larger IT system.

- Factors affecting the choice of digital technology:
  - user experience – ease of use, performance, availability, accessibility
  - user needs
  - specifications
  - compatibility
  - connectivity
  - cost
  - efficiency
  - implementation – timescales, testing, migration to new system(s)
  - productivity
  - security.

B Transmitting data

The concepts, process and implications of transferring data within and between IT systems.

B1 Connectivity

- Wireless and wired methods of connecting devices and transmitting data within and between IT systems.
- How the features of connection types can meet the needs of individuals and organisations.
- The implications of selecting and using different connection types.
- The impact of connection types on the performance of an IT system.

B2 Networks

The concepts and implications for individuals and organisations of connecting devices to form a network.

- The features, use and purpose of different networks:
  - personal area network (PAN)
  - local area network (LAN)
  - wide area network (WAN)
  - virtual private network (VPN).
- Factors affecting the choice of network:
  - user experience – ease of use, performance, availability, accessibility
  - user needs
  - specifications
  - connectivity
  - cost
  - efficiency
  - compatibility
  - implementation: timescales, testing, downtime
  - productivity
  - security.
- How the features of a network and its component parts affect the performance of an IT system.

B3 Issues relating to transmission of data

How the features and processes of data transmission affect the use and performance of IT systems.

- Protocols used to govern and control data transmission for common tasks:
  - email
  - voice and video calls over the internet
  - web pages
  - secure payment systems.
- Security issues and considerations when transmitting data over different connection types and networks.
- Factors affecting bandwidth and latency.
- The implications of bandwidth and latency on the use and performance of an IT system.
- Types of compression:
  - lossy
  - lossless.
- The applications and implications of data compression.
- The use and implications of codecs when using and transmitting audio and video in digital format.

C Operating online

The implications for individuals and organisations of using online IT systems.

C1 Online systems

The features, impact and implications of the use of online IT systems to store data and perform tasks.

- The personal and professional uses and applications of cloud storage.
- The personal and professional uses and applications of cloud computing.
- The impact and implications on individuals of using cloud storage and computing.
- The impact and implications on organisations of using cloud storage and computing.
- Systems that enable and support remote working:
  - VPNs
  - remote desktop technologies.
- Factors affecting the use and selection of online systems:
  - security
  - cost
  - ease of use
  - features
  - connectivity.

C2 Online communities

The features of online communities and the implications of their widespread use for organisations and individuals.

- Ways of communicating and interacting with online communities:
  - social media
  - blog, microblog, vlog
  - wiki
  - chatrooms
  - instant messaging
  - podcasts
  - forums.
- The implications for individuals of using and accessing online communities:
  - user experience – ease of use, performance, availability, accessibility
  - meeting needs
  - cost
  - privacy
  - security.
- The implications for organisations of using and accessing online communities:
  - employee and customer experience – ease of use, performance, availability, accessibility
  - customer needs
  - cost
  - implementation – timescales, testing
  - replacement or integration with current systems
  - productivity
  - working practices
  - security.

D Protecting data and information

The issues and implications of storing and transmitting information in digital form.

D1 Threats to data, information and systems

The implications of accidental and malicious threats to the security and integrity of data, held in, and used by, IT systems.

- The characteristics of threats to data:
  - viruses and other malware
  - hackers
  - phishing
  - accidental damage.
- The impact of threats to data, information and systems on individuals.
- The impact of threats to data, information and systems on organisations.

D2 Protecting data

The features, uses and implications of systems and procedures used to protect the data of individuals and organisations.

- Processes and implications of techniques for protecting data and systems:
  - file permissions
  - access levels
  - backup and recovery procedures
  - passwords
  - physical access control
  - digital certificates
  - protocols.
- The features, characteristics and implications of using antivirus software to protect data.
- The features, characteristics and implications of using firewalls to protect data.
- The features, applications and implications of encryption methods used to protect:
  - stored data
  - data during transmission.
- The role of current legislation in protecting data and IT systems from attack and misuse.
- The impact on individuals and organisations of legislation designed to protect data and IT systems.
- The purpose, role and impact, on individuals and organisations, of codes of practice for the protection of data produced by the Information Commissioner's Office (UK) and professional bodies.

E Impact of IT systems

The uses, issues and implications of IT systems and their impact on individuals and organisations.

E1 Online services

How the features of online services are used to meet the needs of individuals and organisations.

- The features and implications of using online services to support:
  - retail
  - financial services
  - education and training
  - news and information
  - entertainment and leisure
  - productivity
  - booking systems.

- The uses, impact and implications for individuals and organisations of:
  - transactional data
  - targeted marketing
  - collaborative working.

E2 Impact on organisations

- The features and implications of IT systems used by organisations for:
  - stock control
  - data logging
  - data analysis
  - general office tasks
  - creative tasks
  - advertising
  - manufacturing
  - security.
- The impact and implications for organisations of IT systems in terms of:
  - user experience – ease of use, performance, availability, accessibility
  - employee and customer needs
  - cost
  - implementation – timescales, testing, downtime
  - replacement or integration with current systems
  - productivity
  - working practices
  - staff training needs (initial and ongoing)
  - user support
  - security.

E3 Using and manipulating data

The uses, processes and implications for individuals and organisations of accessing and using data and information in digital form.

- Sources of data:
  - primary
  - secondary.
- Judging and ensuring the reliability of data.
- The characteristics and implications of methods of collecting data and opinions:
  - survey
  - questionnaire
  - focus groups
  - interview.
- Reasons for ensuring data accuracy.
- Methods of ensuring data accuracy:
  - verification
  - validation.
- Methods of extracting and sorting data.
- Numerical and data modelling.
- Presenting data and results.
- The characteristics and implications of user interfaces for data collection and processing systems:
  - ease of use
  - accessibility
  - error reduction
  - intuitiveness

- functionality
- performance
- compatibility.

F Issues

The concepts, impacts and implications of issues resulting from the use of IT systems.

F1 Moral and ethical issues

The implications, for individuals, organisations and wider society, of moral and ethical factors of using information technology.

- The moral and ethical factors of the use of information technology:
  - privacy
  - environmental
  - unequal access to information technology
  - online behaviour and netiquette
  - globalisation
  - freedom of speech and censorship
  - acceptable use.
- The purpose and role of codes of practice produced by professional bodies for the use of IT systems.
- The impact of codes of practice on individuals and organisations.

F2 Legal issues

The legal issues relating to the use of IT systems and the implications for individuals, organisations and wider society.

- The role of current legislation (and subsequent additions and amendments) in protecting users and their data from attack and misuse:
  - Computer Misuse Act 1990
  - Police and Justice Act 2006 (Computer Misuse)
  - Copyright, Designs and Patents Act 1988
  - The Copyright (Computer Programs) Regulations 1992
  - The Health and Safety (Display Screen Equipment) Regulations 1992
  - Data protection legislation
  - Consumer Rights Act 2015.
- Guidelines and current legislation (and subsequent additions and amendments) designed to ensure the accessibility of IT systems:
  - Disability Discrimination Acts 1995 and 2005
  - Equality Act 2010
  - British Standards Institute (BSI) codes of practice
  - Open Accessibility Framework (OAF)
  - Web Content Accessibility Guidelines (WCAG) 1.0 and 2.0 World Wide Web Consortium (W3C®).
- The moral and ethical factors of the use of IT systems:
  - health and safety
  - copyright
  - computer misuse
  - protection of data
  - privacy
  - accessibility.

Grade descriptors

To achieve a grade, a learner is expected to demonstrate these attributes across the essential content of the unit. The principle of best fit will apply in awarding grades.

Level 3 Pass

Learners are able to apply knowledge and understanding of key information technology concepts to a range of familiar vocational contexts. They can apply knowledge and understanding of IT systems to deconstruct problems in common situations and apply standard IT conventions to produce solutions with supporting reasoning. Learners can identify the impact of effective and ineffective uses of IT systems and recommend ways in which IT can be developed and/or improved. They can explore and make judgements on the impact of the use of IT on individuals and organisations.

Level 3 Distinction

Learners are able to analyse complex information, data and situations, in vocational contexts, in order to draw conclusions and make valid observations. They can synthesise their knowledge and understanding of IT systems to deconstruct complex problems, drawing on various sources of information to develop effective solutions. Learners can evaluate the effectiveness of IT systems and make justified recommendations for further developments and future actions. They can make valid, justified judgements on the impact of IT on individuals, organisations and wider society.

Key terms typically used in assessment

The following table shows the key terms that will be used consistently by Pearson in our assessments to ensure students are rewarded for demonstrating the necessary skills.

Please note: the list below will not necessarily be used in every paper/session and is provided for guidance only.

Command or term	Definition
Analyse	Learners examine in detail a scenario or problem to discover its meaning or essential features. Learners will break down the problem into its parts and show how they inter-relate. There is no requirement for any conclusion.
Assess	Learners give careful consideration to all the factors or events that apply and identify which are the most important or relevant. Make a judgement on the importance of something.
Calculate	Learners apply some form of mathematical or computational process.
Complete	Learners complete a diagram or process. Can apply to problems/solutions of varying complexity.
Demonstrate	Learners illustrate and explain how an identified computer system or process functions. May take the form of an extended writing response, a diagram or a combination of the two.

Command or term	Definition
Describe	Learners provide an account of something, or highlight a number of key features of a given topic. May also be used in relation to the stages of a process.
Discuss	Learners investigate a problem or scenario showing reasoning or argument.
Draw	Learners represent understanding through the use of a diagram or flowchart.
Explain	Learners denote a series of linked points needed and/or justify or expand on an identified point required.
Evaluate	Learners review and synthesise information to provide a supported judgement about the topic or problem. Typically, a conclusion will be required.
Identify	Learners assess factual information, typically when making use of given stimuli. Requires a single-word or short-sentence answer.
Produce	Learners provide a solution that applies established constructs to a given computing problem.
State, name, give	Learners assess factual information. Requires a single-word or short-sentence answer.
Write	Learners produce a solution, or mechanism used as part of, a solution to a given computing problem.

Links to other units

The assessment for this unit should draw on knowledge, understanding and skills developed from:

- Unit 2: Creating Systems to Manage Information
- Unit 3: Using Social Media in Business.

This unit would relate to teaching of:

- Unit 5: Data Modelling
- Unit 6: Website Development.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit.