

Unit 228

Information systems engineering

Unit summary

This unit is about the provision of a theoretical foundation, focus and theme to a subject by using a database approach.

Aims

The unit aims to develop the candidate's ability to develop, analyse, design and effectively use information systems.

Prerequisites

It is expected that candidates will have a working knowledge of the materials in the four compulsory papers of the Certificate examination and with subject 9107-108 Software and information systems engineering and practical experience of information systems.

Learning outcomes

There are **three** outcomes to this unit. The candidate will be able to:

- Describe, analyse, evaluate and use information systems
- Design and implement database systems
- Investigate, analyse and evaluate world wide web based information systems

Guided learning hours

It is recommended that 300 hours should be allocated for this unit. 120 of those hours are actual taught hours. This may be on a full time or part time basis.

Key Skills

This unit contributes towards the Key Skills in the following areas:

IT4.1

Develop a strategy for using IT skills over an extended period of time.

IT4.2

Monitor progress and adapt your strategy, as necessary, to achieve the quality of outcomes required in work involving the use of IT for **two** different, complex purposes.

IT4.3

Evaluate your overall strategy and present the outcomes from your work using at least **one** presentation, showing integration of text, images and number.

C4.1

Develop a strategy for using communication skills over an extended period of time.

C4.2

Monitor progress and adapt your strategy, as necessary, to achieve the quality of outcomes required in work involving:

- **one** group discussion about a complex subject;
- **one** extended written communication about a complex subject.

C4.3

Evaluate your overall strategy and present the outcomes from your work, using at least **one** formal oral presentation, including the use of two images to illustrate complex points.

PS4.1

Develop a strategy for using skills in problem solving over an extended period of time.

PS4.2

Monitor progress and adapt your strategy, as necessary, to achieve the quality of outcomes required when tackling **one** complex problem with at least three options.

PS4.3

Evaluate your overall strategy and present the outcomes from your work using a variety of methods.

Occupational Standards

This unit has been mapped to the following National Occupational Standards:

- 1.1.1 Identify the requirements of clients for engineering products or processes
- 1.1.2 Produce specifications for engineering products or processes
- 1.4.1 Establish a design brief for engineering products or processes
- 1.4.2 Develop a strategy for the design process
- 1.4.3 Create designs for engineering products or processes
- 1.4.4 Evaluate designs for engineering products or processes
- 6.2.1 Assure the quality of engineering products or processes
- 8.1.1 Maintain and develop own engineering expertise

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Outcome 1

Describe, analyse, evaluate and use information systems

Knowledge requirements

The candidate knows how to:

- 1 describe the range of scope of data used in information systems
 - a bibliographic/free text
 - b formatted text
 - c record oriented
 - d file based
 - e legacy data
- 2 analyse and evaluate existing information systems
- 3 investigate emerging developments in information systems
- 4 extend existing information systems
- 5 apply multimedia formats and their storage, and use transmission and compression techniques
- 6 understand the ideas of data management and data mining and the concept of a data warehouse
- 7 describe the role of a database administrator
- 8 apply a multiuser relational database product including its
 - a data management
 - b application development techniques
- 9 apply the use of Forms as a metaphor to the interface to an information system
- 10 design a database user interface including
 - a menu design
 - b use of colour
 - c use of graphics
- 11 assess programming Form activations using
 - a 4GL code
 - b embedded SQL
 - c event procedures
- 12 use other programming techniques such as embedded SQL in C
 - a static
 - b dynamic

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Outcome 2

Design and implement database systems

Knowledge requirements

The candidate knows how to:

- 1 understand the principles of database design and implementation
- 2 apply methods for modelling information systems including diagramming conventions supported by
 - a Yourdon/SSADM utilising data flow diagrams (DFD) to show
 - i process modelling
 - ii entity relationship (ER) diagrams
 - b alternative process design techniques
 - i Unified Modelling Language (UML)
- 3 compare and evaluate different approaches
- 4 utilise relational modelling and data analysis
- 5 understand functional dependency theory and normalisation
- 6 apply Boyce Codd Normal Form rule to a relational data set
- 7 undertake data modelling
 - a mapping an ER model to form a relational data set (Schema)
 - b coding a schema in SQL
- 8 create indexes, keys and clusters
- 9 apply entity and referential integrity
- 10 compare the data centred approach with the file based approach
- 11 assess data integrity and quality control
- 12 understand transaction processing
- 13 use a data dictionary
- 14 discuss data independence and physical views of data
- 15 compare and assess distributed information systems and database architectures
- 16 understand relational calculus and algebra
- 17 understand theoretical foundations of SQL
- 18 assess SQL standards and be able to apply these standards for
 - a data definition
 - b views
 - c updates insertion of referential integrity constraints
- 19 understand open SQL standard
- 20 recognise the operators available in single and multiple (Join) table queries
- 21 use embedded SQL

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Outcome 3

Investigate, analyse and evaluate world wide web based information systems

Knowledge requirements

The candidate knows how to:

- 1 assess www based information systems
- 2 undertake comparison of different client server architectures
- 3 apply www access to databases through techniques such as cgi scripts and HTML
- 4 develop interactive graphical tools (applets) and the choice of tools for web enabled information processing
- 5 undertake effective implementation, evaluation and testing of systems

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Recommended reading list

Core texts	Author(s)	Publisher	ISBN
A Guide to SQL	Pratt	Boyd & Fraser	0877095205
Designing the User Interface	Scheiderman	Addison-Wesley	0201694972
Fundamentals of Database Systems	Elmasri, Navathe	Addison Wesley	032118095X
Introduction to Database Systems	Date	Addison-Wesley	0321189566
Data Analysis for Database Design	Howe	Oxford University Press	0340691506 o/p
Database, Design & Management	Stamper, Price	McGraw Hill	0075577860 o/p
Engineering the Human Computer Interface	Downton	McGraw Hill	007707727X o/p