

Unit Title:	Data Structures and Algorithms
OCR unit number	41 (R/601/3297)
Level:	4
Credit value:	15
Guided learning hours:	90
Unit expiry date:	31/03/2015

Evidence for this unit can only be achieved through actual work in a work environment. Simulation is not permissible for any competence based unit.

Unit purpose and aim

This unit provides in depth coverage of the use of data structures in information systems, together with the algorithms associated with them.

Learning Outcomes	Assessment Criteria
<p>The Learner will:</p> <p>1 Understand the structure and uses of various data structures and their associated algorithms</p>	<p>The Learner can:</p> <p>1.1 Define the terminology used to describe the elements of data structures including arrays, linked lists, stacks, queues, trees, graphs and sets</p> <p>1.2 Explain how one-dimensional and multi-dimensional arrays are structured and processed</p> <p>1.3 Explain how linked lists (including singly, doubly and circular linked lists) are structured and processed</p> <p>1.4 Explain how stacks and queues are structured and processed</p> <p>1.5 Explain how trees and graphs are structured and processed</p> <p>1.6 Explain how sets are structured and processed</p>
<p>2 Understand the operation of established algorithms</p>	<p>2.1 Explain the operation and performance of sorting and search algorithms</p> <p>2.2 Explain the operation of recursive algorithms and identify situations when recursion is used</p>
<p>3 Select appropriate data structures and associated algorithms for specified problems</p>	<p>3.1 Given a specified problem, choose a data structure and associated algorithm and justify the selection</p>
<p>4 Describe the data structures and associated algorithms in a non-executable program specification language</p>	<p>4.1 Specify the structure and associated algorithms of arrays, linked lists, stacks, queues, trees, graphs and sets in well-established specification languages</p> <p>4.2 Specify the behaviour of sorting, searching and recursive algorithms using well-established specification languages</p> <p>4.3 Demonstrate the operation of data-structures and algorithms by hand execution of the associated algorithms with specified test data</p>

Learning Outcomes	Assessment Criteria
5 Implement data structures and algorithms in an executable programming language	5.1 Implement arrays, linked lists, stacks, queues, trees, graphs and sets in the context of well-defined problems in an executable programming language 5.2 Implement sorting, searching and recursive algorithms in the context of well-defined problems in an executable programming language 5.3 Demonstrate the correct operation of data structure algorithms implemented in an executable programming language by devising and executing testing strategies
6 Understand how strings are structured and processed	6.1 Explain the structure of strings 6.2 Identify common string operations 6.3 Demonstrate the outcome of string operations on specified strings

Assessment

The qualification has been designed to develop knowledge, understanding and skills in the full range of functions involved in the planning and control, hardware, software and systems installation, software solutions and the production of customer support materials. It also provides opportunities for learners to study towards system and network management, to specialise in one or more specific programming languages in addition to being able to take units that are vendor specific.

Each unit within the specification is designed around the principle that candidates will build a portfolio of evidence relating to progression towards meeting the unit assessment criteria.

The unit assessment criteria reflect the demands of the learning outcomes for each unit.

In order for candidates to be able to effectively progress towards meeting the requirements of each assessment criteria, tutors must make sure that the supporting knowledge, understanding and skills requirements for each criteria are fully addressed. The identified knowledge, understanding and skills are not exhaustive and may be expanded upon or tailored to particular contexts to which the unit is being taught and the assessment criteria applied.

We recommend that teaching and development of subject content and associated skills be referenced to real vocational situations, through the utilisation of appropriate industrial contact, vocationally experienced delivery personnel, and real life case studies.

All the learning outcomes and assessment criteria must be clearly evidenced in the submitted work, which is externally moderated by OCR.

Results will be Pass or Fail.

Evidence requirements

All aspects of the assessment criteria must be covered and evidence must be available that shows where and how the assessment objectives have been achieved.

Candidates should clearly detail all the criteria listed to evidence knowledge and understanding.

Candidates are encouraged to choose activities which will allow them to cover all or a majority of the criteria at one time. It is not necessary to use different activities for each element of the criterion.

Guidance on assessment and evidence requirements

Candidates do not have to achieve units in any particular order and tutors should tailor learning programmes to meet individual candidate needs. It is recommended that, wherever possible, centres adopt an holistic approach to the delivery of the qualification and identify opportunities to link the units.

Centres are free to deliver this qualification using any mode of delivery that meets the needs of their candidates. Whatever mode of delivery is used, centres must ensure that learners have access to appropriate resources and consider the candidates' complete learning experience when designing learning programmes. This is particularly important in relation to candidates studying part time alongside real work commitments where candidates may bring with them a wealth of experience that should be utilised to maximum effect by tutors and assessors.

It is difficult to give a detailed answer to how much evidence is required as it depends on the type of evidence collected and the judgement of assessors. The main principles, however, are as follows: for a candidate to be judged competent in a unit, the evidence presented must satisfy:

- all the items listed, in the section 'Learning Outcomes'
- all the areas in the section 'Assessment Criteria'

Questioning the candidate is normally an ongoing part of the assessment process, and is necessary to:

- test a candidate's knowledge of facts and procedures
- check if a candidate understands principles and theories *and*
- collect information on the type and purpose of the processes a candidate has gone through.
- candidate responses must be recorded

The quality and breadth of evidence provided should determine whether an assessor is confident that a candidate is competent or not. Assessors must be convinced that candidates working on their own can work independently to the required standard.

Additional information

For further information regarding administration for this qualification, please refer to the OCR document '*Admin Guide: Vocational Qualifications*' (A850) on the OCR website www.ocr.org.uk .