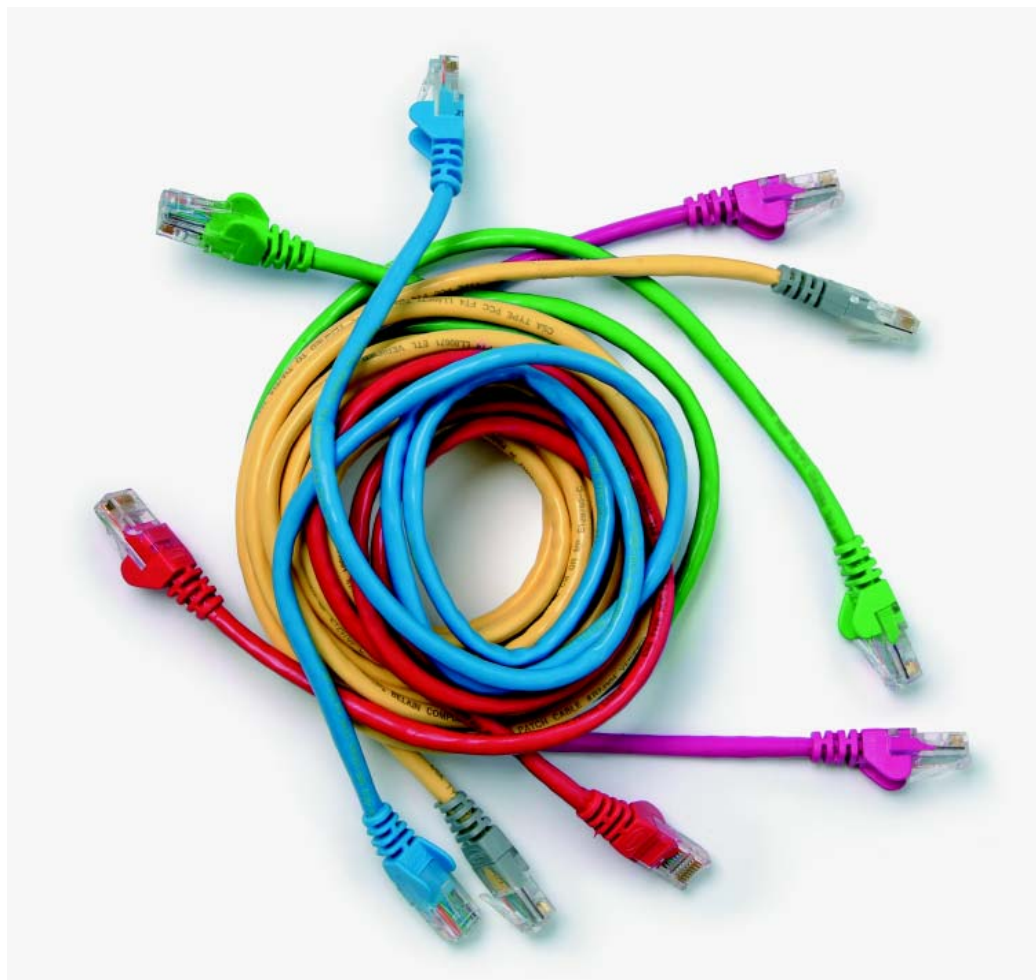


# Systems and Principles Unit Syllabus

## Level 3 Software development fundamentals

7540-033



## **About City & Guilds**

City & Guilds is the UK's leading provider of vocational qualifications, offering over 500 awards across a wide range of industries, and progressing from entry level to the highest levels of professional achievement. With over 8500 centres in 100 countries, City & Guilds is recognised by employers worldwide for providing qualifications that offer proof of the skills they need to get the job done.

## **City & Guilds Group**

The City & Guilds Group includes City & Guilds, City & Guilds Institute, ILM (the Institute of leadership & Management) which provides management qualifications, learning materials and membership services, NPTC which offers land-based qualifications and membership services, and HAB (the Hospitality Awarding Body). City & Guilds also manages the Engineering Council Examinations on behalf of the Engineering Council.

## **Equal opportunities**

City & Guilds fully supports the principle of equal opportunities and we are committed to satisfying this principle in all our activities and published material. A copy of our equal opportunities policy statement is available on the City & Guilds website.

## **Copyright**

The content of this document is, unless otherwise indicated, © The City and Guilds of London Institute 2010 and may not be copied, reproduced or distributed without prior written consent.

However, approved City & Guilds centres and candidates studying for City & Guilds qualifications may photocopy this document free of charge and/or include a locked PDF version of it on centre intranets on the following conditions:

- centre staff may copy the material only for the purpose of teaching candidates working towards a City & Guilds qualification, or for internal administration purposes
- candidates may copy the material only for their own use when working towards a City & Guilds qualification

The *Standard Copying Conditions* on the City & Guilds website also apply.

Please note: National Occupational Standards are not © The City and Guilds of London Institute. Please check the conditions upon which they may be copied with the relevant Sector Skills Council.

## **Publications**

City & Guilds publications are available on the City & Guilds website or from our Publications Sales department at the address below or by telephoning +44 (0)20 7294 2850 or faxing +44 (0)20 7294 3387.

Every effort has been made to ensure that the information contained in this publication is true and correct at the time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement and the right is reserved to change products and services from time to time. City & Guilds cannot accept liability for loss or damage arising from the use of information in this publication.

## **City & Guilds**

**1 Giltspur Street**

**London EC1A 9DD**

**T +44 (0)844 543 0000 (Centres)**

**T +44 (0)844 543 0033 (Learners)**

**F +44 (0)20 7294 2413**

**[www.cityandguilds.com](http://www.cityandguilds.com)**

**[learnersupport@cityandguilds.com](mailto:learnersupport@cityandguilds.com)**

# Contents

## Unit 033    Software development fundamentals

Syllabus Overview	2
Outcome 1    Understand the principles of software design	3
Outcome 2    Apply the techniques of software design	4
Unit record sheet	5

# Unit 033 Software development fundamentals

## Syllabus Overview

**Unit accreditation number** L/601/3184

**Credit value** 12

### **Rationale**

This unit covers the principles of software design and the application of the techniques used in software design to represent software solutions.

### **Learning outcomes**

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

- 1 Understand the principles of software design
- 2 Apply the techniques of software design

### **Guided learning hours**

It is recommended that **90** guided learning hours should be allocated for this unit. This may be on a full time or part time basis.

### **Connections with other qualifications**

This unit contributes towards the learning outcomes and assessment criteria required for the level 3 Diploma in ICT Professional Competence.

### **Assessment and grading**

Assessment will be by means of a **set assignment** covering practical activities and underpinning knowledge.

**Underpinning knowledge**

The learner will be able to

- 1 Describe the role of software design and computer programming in the IT Systems Development Life Cycle (SDLC)
- 2 Describe the application and limits of programming paradigms procedural, object oriented and event driven and the available supporting tools and environments (eg CASE tools, IDEs)
  - a explain why procedural programs should have high cohesion and low coupling between modules
  - b explain that in object oriented programming languages an object contains both data (attributes) and code (methods) encapsulated within the object
  - c state that encapsulation prevents access to data within an object directly but allows access through the object's interfaces
  - d explain how CASE (Computer Aided System Engineering) tools are typically used to support the whole SDLC
  - e describe how event driven programs respond to events initiated by the user
  - f describe how an IDE (Integrated Development Environment) assists the software developer with the development of software and typically includes a debugger
- 3 Explain sequence, selection and iteration as used in computer programming
  - a explain that program instructions executed in sequence are executed in order one after the other
  - b describe the control structures used for selection eg if, if ... else, switch/Select Case/EVALUATE and how they are used to alter the flow of execution
  - c explain how iteration means that defined program instructions can be repeatedly executed
  - d describe and distinguish between various types of iteration: definite, indefinite, pre-condition, post-condition
- 4 Explain abstraction of data and code and the use of predefined data and code in computer programming
  - a state how programming languages contain predefined code eg functions, classes/objects which save a developer writing their own
  - b state how a programming language typically contains predefined constants
- 5 Explain the importance of the readability and understandability of code and how these can be improved by naming, comments and layout
- 6 Describe how the following factors contribute to the quality of code: efficiency, reliability, robustness, usability, portability and maintainability

## Unit 033

## Software development fundamentals

### Outcome 2

### Apply the techniques of software design

#### Practical activities

The learner will be able to

- 1 develop algorithms to represent problems
- 2 identify and define data and file storage requirements including predefined data items
- 3 identify and define program structures including predefined code items
- 4 identify and represent required inputs and outputs.
- 5 use tools (eg pseudocode) to express software designs

#### Underpinning knowledge

The learner will be able to

- 1 describe algorithms eg input, output, sorting, searching, validation
- 2 describe the basic data types eg integer, floating point, character, string, boolean
- 3 describe one-dimensional and two-dimensional arrays and the use of subscripts
- 4 explain the meaning of the terms file, record and field and describe the relationships between them
- 5 state the types of error that can occur when accessing a file eg file does not exist, record does not exist, read past end of file, hardware fault
- 6 explain how a data structure can be used to create the following: table, stack, queue, tree, linked list
- 7 explain the advantages of using pre-written library routines or objects eg built-in, in-house, third party
- 8 explain the types of diagrammatical representations used to show the program structure:
  - a an Event/Action chart used to represent the links between events and code for an event driven program
  - b a structure chart used to represent the links between modules in a procedural program
  - c an object model used to show the links between objects for an object oriented program
- 9 describe the process of defining screen and print layouts
- 10 describe the types of validation check that may be performed eg range, type (alphabetic, numeric), check digit, date
- 11 explain that pseudocode or structured English may be used as a program design language

# Unit record sheet

Use this form to track your progress through this unit.

Tick the boxes when you have covered each outcome. When they are all ticked, you are ready to be assessed.

<b>Outcome</b>	<b>✓</b>	<b>Date</b>
<b>1 Understand the principles of software design</b>	<input type="checkbox"/>	
<b>2 Apply the techniques of software design</b>	<input type="checkbox"/>	

**Candidate Signature** ..... **Date** .....

**City & Guilds  
Registration Number** .....

**Quality nominee  
(if sampled)** ..... **Date** .....

**Assessor Signature** ..... **Date** .....

**External Verifier  
Signature (if sampled)** ..... **Date** .....

**Centre Name** ..... **Centre Number** .....

---

**Published by City & Guilds**

**1 Giltspur Street**

**London**

**EC1A 9DD**

**T +44 (0)844 543 0000 (Centres)**

**T +44 (0)844 543 0033 (Learners)**

**F +44 (0)20 7294 2400**

**[www.cityandguilds.com](http://www.cityandguilds.com)**

**City & Guilds is a registered charity  
established to promote education and  
training**