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BCS Level 3 Award in Coding and Logic Syllabus QAN 603/0523/X

**Version 3.1
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This is a United Kingdom government regulated qualification which is administered and approved by one or more of the following: Ofqual, Qualification in Wales, CCEA or SQA

BCS Level 3 Award in Coding and Logic

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Change History

Any changes made to the syllabus shall be clearly documented with a change history log. This shall include the latest version number, date of the amendment and changes made. The purpose is to identify quickly what changes have been made.

Version Number	Changes Made
Version 1.0 July 2016	Syllabus Created
Version 1.1 October 2016	Syllabus amended – title of syllabus was referred to incorrectly in the introduction.
Version 1.2 October 2016	Syllabus amended – Page 9, 2.2 REPEAT changed to post-conditioned loop from pre-conditioned.
Version 1.3 December 2016	Compliance statement added.
Version 2.0	Document amended – multiple changes to content. Objectives added (page 5) Eligibility for the Examination wording changed (page 5) Changes to content for all Syllabus areas (pages 7-10) Question Weightings changed in line with syllabus changes (page 11) Recommended Reading List added (page 12) Other minor formatting changes including correction of the module title in the footer.
Version 3.0 August 2017	Major amendments following full review
Version 3.1 September 2017	Amendments to topic area weightings.

Introduction

This award is the fourth of the five knowledge modules required for the Level 3 Infrastructure Technician Apprenticeship. It covers the range of concepts, approaches and techniques that are applicable to coding and logic, for which apprentices are required to demonstrate their knowledge and understanding.

Objectives

Apprentices should be able to demonstrate knowledge and understanding of business processes principles and techniques. Key areas are:

1. Understanding working / scripting at the command line: particularly when supporting any server work.
2. Understanding and recognising different coding and language.
3. Understanding application life cycle management.
4. Understanding algorithms and data structures.
5. Understanding web page development.

Evidence of lessons learnt in these key areas should be collected and reflected upon when the apprentice is compiling the summative portfolio as the apprentice could identify how the task might be done better/differently with knowledge subsequently gained.

Target Audience

The award is relevant to anyone enrolled on the Level 3 Infrastructure Technician Apprenticeship programme.

Course Format and Duration

Candidates can study for this award by attending a training course provided by a BCS accredited training provider. The estimated total qualification time for this award is 34.5 hours.

Eligibility for the Examination

Individual employers will set the selection criteria, but this is likely to include 5 GCSEs (especially English, mathematics and a science or technology subject); other relevant qualifications and experience; or an aptitude test with a focus on IT skills.

Level 2 English and Maths will need to be achieved, if not already, prior to taking the endpoint assessment.

Format and Duration of the Examination

The format for the examination is a 30-minute multiple-choice examination consisting of 20 questions. The examination is closed book (no materials can be taken into the examination room). The pass mark is 13/20 (65%).

Additional Time for Apprentices Requiring Reasonable Adjustments Due to a Disability

Apprentices may request additional time if they require reasonable adjustments. Please refer to the [reasonable adjustments policy](#) for detailed information on how and when to apply.

Additional Time for Apprentices Whose Language is Not the Language of the Examination

If the examination is taken in a language that is not the apprentice's native / official language, then they are entitled to 25% extra time.

If the examination is taken in a language that is not the apprentice's native / official language, then they are entitled to use their own **paper** language dictionary (whose purpose is translation between the examination language and another national language) during the examination. Electronic versions of dictionaries will **not** be allowed into the examination room.

Guidelines for Training Providers

Each major subject heading in this syllabus is assigned an allocated time. The purpose of this is two-fold: first, to give both guidance on the relative proportion of time to be allocated to each section of an accredited course and an approximate minimum time for the teaching of each section; second, to guide the proportion of questions in the exam. Training providers may spend more time than is indicated and apprentices may spend more time again in reading and research. Courses do not have to follow the same order as the syllabus. Courses may be run as a single module or broken down into two or three smaller modules.

This syllabus is structured into sections relating to major subject headings and numbered with a single digit section number. Each section is allocated a minimum contact time for presentation. Apprentices should be encouraged to consider their summative portfolio throughout the modules.

Syllabus

For each top-level area of the syllabus a percentage and K level is identified. The percentage is the exam coverage of that area, and the K level identifies the maximum level of knowledge that may be examined for that area.

1 General overview of command line scripts (15%, K2)

In this topic, the apprentice will gain a general overview of command line scripts. The successful apprentice should be able to:

1.1 Explain what scripts are and what purpose they serve.

- Commonly used scripting languages.
 - DOS shell / Batch;
 - PowerShell;
 - Bash.
- Automating tasks in Windows and Linux.
- Command line interface (CLI) and what purpose they serve.
 - Performing systems administration tasks in Windows.
 - ipconfig
 - dir
 - netstat /ob
 - ping
 - mkdir
 - cd
 - del(ete)
 - ren(ame)
 - copy
 - move
 - systeminfo
 - Performing systems administration tasks in Linux.
 - ifconfig eth0 / ip addr show eth0
 - ls
 - netstat -a
 - ping
 - mkdir
 - cd
 - rm (remove)
 - mv (move) - moves and renames
 - lscpu - CPU info
 - free -m
 - top
 - tail

1.2 Explain what the command line interface is and how it can be used in an infrastructure capacity.

- Use of commands, command line switches and command line arguments, their purpose and what each term means.
 - General format of commands is <command> <switch> <argument>
 - Linux:
 - ls -l /
 - ls *
 - ls
 - Windows:
 - dir /b \
 - dir *
 - dir

2 Common commands and uses of scripts (40%, K2)

In this topic area, the apprentice will learn the common commands and uses of scripts. The successful apprentice should be able to:

2.1 Recognise file and directory operations in Windows and Linux.

- Copy;
- Rename;
- Move;
- Delete.

2.2 Identify diagnostics for networking, file systems, security and processes.

- Windows:
 - ipconfig
 - ping
 - nslookup
 - tracert
 - chkdsk
 - netstat
- Linux:
 - ifconfig
 - ping
 - nslookup
 - traceroute
 - fsck
 - netstat

2.3 Explain how to achieve the running of scheduling tasks automatically at a set time.

- Windows - through Windows Scheduler;
- Linux - though CRON.

2.4 Recognise Directory listings in Windows and Linux.

- time based sort;
- alphanumeric based sort.

2.5 Recognise file and directory permissions.

- Linux:
 - viewing;
 - changing.
- Windows:
 - icacls.

2.6 Recognise login script types.

- Windows:
 - Bat;
 - PS1.
- Linux:
 - Bash.

2.7 Explain how to compress and decompress files.

- Windows:
 - Zip.ps1
 - Compress-archive
- Linux:
 - gzip

2.8 Explain how to list and stop running processes.

- Windows:
 - net stop
 - net start
- Linux:
 - ps
 - kill

3 Scripting Language Syntax (10%, K2)

In this topic area, the apprentice will understand and recognise different coding and language. The successful apprentice should be able to:

3.1 Recognise the syntax of scripting languages; with a focus on PowerShell, Windows DOS command line and Linux shell commands.

- common scripting language features;
 - instructions;
 - data types;
 - strings;
 - integers;
 - arrays;
 - floating point;
 - operators;
 - comparison;
 - arithmetic and logical;
- mathematical +-* /
- comparison;
 - equal;
 - not equal;
 - greater than;
 - less than;
- functions;
- output;
 - log file;
 - screen;
 - argument feeding another script;
 - redirect to a file;
- Constructs;
 - for loops;
 - while loops;
 - do while loops;
 - if / else.

4 Application Lifecycle management (5%, K2)

In this topic area, the apprentice will understand application lifecycle management. The successful apprentice should be able to:

- 4.1 Describe the primary steps required for scripting / software development.
- Plan - Investigate and understand the purpose of the script and the problem it will solve.
 - Design - Create a document detailing how the script will operate including any data flow.
 - Develop / Build - Create the script, complete with comments.
 - Test - Debug and test the script, preferably in a proper test environment (not live production, ideally a “model office”).
 - Maintain - Document any changes made to the script and update and version the script as required, logging changes at the top of the script.

5 Algorithms and Data Structures (15%, K2)

In this topic area, the apprentice will understand algorithms and data structures. The successful apprentice should be able to:

- 5.1 Explain the common algorithms that may be used on a day to day basis by an infrastructure technician.
- Searches;
 - log file searches;
 - file searches, file matching;
 - in file searches;
 - Windows – find
 - Linux – grep
 - sorting and filtering;
 - file filtering using wildcards;
 - log file filtering using wildcards;
 - file sorting using command line switches;
 - Windows - DIR
 - Linux - ls

5.2 Describe the following data structures, how they are composed and an example of their usage.

- The purpose of delimiters and why they are sometimes (but not always) required in data structures.
- data structure types;
 - int;
 - float;
 - string;
 - array;
- data files;
 - CSV;
 - XML.

5.3 Explain that 'NULL' is used to represent no value in data structures.

- The “null” expression is used to signify that no value has been assigned to a specific field in an SQL or other database field. Some scripting languages also assign null values to variables when they are created.

6 The Fundamentals of Web Page Development (15%, K2)

In this topic area, the apprentice will understand the fundamentals of web page development. The successful apprentice should be able to:

6.1 Recognise HTML (Hypertext Mark-up Language).

- basic tags `<, <html><body><head><h1><h2>, <A>`

6.2 Explain how basic Cascading Style Sheets (CSS) is used to provide common look across pages.

6.3 Describe the components, methods and protocols used to host a web site.

- FTP / FTPS (File Transfer Protocol);
- HTTP / HTTPS.

6.4 Recognise the purpose of the OWASP Top 10.

Levels of Knowledge / SFIA Levels

This syllabus will provide apprentices with the levels of difficulty / knowledge skill highlighted within the following table, enabling them to develop the skills to operate at the levels of responsibility indicated. The levels of knowledge and SFIA levels are explained on the website www.bcs.org/levels. The levels of knowledge above will enable apprentices to develop the following levels of skill to be able to operate at the following levels of responsibility (as defined within the SFIA framework) within their workplace:

Level	Levels of Knowledge	Levels of Skill and Responsibility (SFIA)
K7		Set strategy, inspire and mobilise
K6	Evaluate	Initiate and influence
K5	Synthesise	Ensure and advise
K4	Analyse	Enable
K3	Apply	Apply
K2	Understand	Assist
K1	Remember	Follow

Question Weighting

Syllabus Area	Target number of questions
1. General overview of command line scripts	3
2. Common commands and uses of scripts	8
3. Scripting Language Syntax	2
4. Application Lifecycle management	1
5. Algorithms and Data Structures	3
6. The Fundamentals of Web Page Development	3
Total	20 Questions

Format of Examination

Type	20 Question Multiple Choice.
Duration	30-minute. An additional 25% will be allowed for apprentices sitting the examination in a language that is not their native / mother tongue.
Pre-requisites	Training from a BCS accredited training provider is strongly recommended but is not a pre-requisite.
Supervised	Yes.
Open Book	No.
Pass Mark	13/20 (65%).
Calculators	Calculators cannot be used during this examination.
Total Qualification Time (TQT)	34.5 hours, 19 GLH recommended.
Delivery	Online.

Trainer Criteria

Criteria	<ul style="list-style-type: none">▪ Have 10 days training experience or have a train the trainer qualification▪ Have a minimum of 3 years practical experience in the subject area
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Classroom Size

Trainer to Apprentice ratio	1:16
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