

# **BCS Higher Education Qualifications**

## **Level 4 Certificate in IT**

### **Computer Network Technology Syllabus**

Version 4.0

December 2016

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

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## 1. 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 the changes made. The purpose is to identify quickly what changes have been made.

Version Number	Date	Changes Made
Version 1.0	May 2014	Released
Version 2.0	March 2015	Re-formatted with syllabus numbering – no change to content
Version 3.0	February 2016	Insertion of reading List - Minor changes to syllabus and booklist
Version 4.0	Dec 2016	Regulated statement added.

## 2. Rationale

This module provides a foundation for all professional computer personnel in computer technology and related topics, in particular the areas of: number systems, hardware, operating systems, systems software, networks and system performance measurement.

## 3. Aims

- To develop an understanding of the principles underlying the architecture and organisation of computer systems.
- To introduce the fundamental building blocks of all digital computers and the operating principles of computer peripherals.
- To evaluate critically the performance data quoted for computer systems.
- To appreciate how computers communicate with each other across networks

## 4. Objectives

Upon successful completion of this module, candidates will be able to demonstrate their competence in, and their ability to:

- Use Boolean algebra and other digital design techniques to construct simple digital circuits such as adders used to build computers.
- Understand different computer architectures
- Use low-level instructions and addressing modes to construct a simple program.
- Read the technical specification of a PC and network systems, interpret the performance indicators, and explain their significance to non-computer personnel.
- Appreciate the importance of the memory hierarchy of a computer system and its peripherals.
- Describe the operating principles of commonly used peripheral devices, their characteristics and performance.
- Understand the role of system software.
- Use the Internet to find information on the performance of computer systems and trends in computer systems.
- Understand the way in which digital information is transmitted across networks, the characteristics of data paths and the need for modulation.

## 5. Prior Knowledge Expected

There are no specific entrance requirements for the Certificate in IT, however it is strongly recommended that all candidates register with an approved centre. Studying with an approved centre will deliver significant benefits.

Candidates are required to become a member of BCS, The Chartered Institute for IT to sit and be awarded the qualifications. Candidates may apply for a four year student membership that will support them throughout their studies.

## 6. Format and Duration of the Examination

The examination is a two hour closed book examination (no materials can be taken into the examination room) based on the syllabus in this document.

Examinations are held twice a year and are undertaken in normal examination conditions with one or more duly appointed invigilators.

The pass mark is 40%.

## 7. Syllabus Detail

Category	Ref	Content
1 FUNDAMENTALS	1.1	Representation of decimal integers (e.g. binary, hexadecimal) and the conversion of integers from one base to another Representation of negative numbers, fractional numbers, and floating point numbers in binary form Decimal to floating point conversion and vice versa, floating-point addition, limitations of floating point arithmetic
	1.2	Gates: AND, OR, NAND, NOR, EOR, inverter Boolean algebra, simplification of logic equations, truth tables Use Boolean algebra to construct digital circuits
	1.3	Sequential logic elements: D flip-flops, RS flip-flops, JK flip-flops Simple logic circuits: Full adder, multiplexer, shift register, counter
	1.4	Current trends in digital design including use of programmable logic elements
2 PROCESSOR ARCHITECTURE	2.1	The family of computers (mainframe, desktop, laptop, embedded, and tablet)
	2.2	The concept of a stored program and the fetch/execute cycle Structure of the CPU at the level of registers, buses, and functional units
	2.3	Instruction formats (one-, two-, three-address; register-to-register machines and load/store machines) Computer instructions (data movement, arithmetical and logical, flow control) The stack and its use in implementing subroutines and exceptions, local storage and recursion
	2.4	Trends in processor technology; pipelining, multicore processors, the limits of Moore's law Information storage: The memory hierarchy from cache to secondary storage The operation of solid state, magnetic and optical storage devices, their performance and characteristics
	2.5	The characteristics and performance of peripherals; for example, display devices, printers, keyboards etc Input/output techniques: peripheral polling, DMA, interrupt driven I/O
3 INTRODUCTION TO OPERATING SYSTEMS AND SYSTEM SOFTWARE	3.1	The human interface; the operating principles and characteristics of printers, display devices, input devices, biometric devices, etc
	3.2	Multitasking: interrupts, concurrency, scheduling, memory management and virtual memory
	3.3	System software: Internet browsers, email systems, security products (e.g. anti virus software)
	3.4	System performance and its evaluation: definition, measurement and benchmark
4 NETWORKS	4.1	Communication principles: characteristics of transmission media, LAN, WAN, Wi-Fi and wireless technologies
	4.2	Protocols for data transmission: ISO 7-layer model for OSI, TCP/IP The data link layer and typical protocols
	4.4	Communications equipment: modems, routers and bridges
	4.5	The Internet Malware: viruses, worms, Trojan horses, spyware and their effect on system reliability and performance
	4.6	Emerging trends and technologies in computer communications including the cloud

## 8. Recommended Reading List

Computer and Network Technology	ISBN 10	ISBN 13
<b>Primary Texts</b>		
• Williams, R., Computer Systems Architecture - A Networking Approach, Prentice Hall (2 <sup>nd</sup> Ed), 2006.	0321340795	978-0321340795
• Clements, A., The Principles of Computer Hardware, Oxford University Press (4 <sup>th</sup> Ed), 2006.	0199273138	978-0199273133
• Tanenbaum, Andrew, S., Modern Operating Systems, Prentice Hall (4 <sup>th</sup> Ed), 2014.	013359162X	978-0133591620
• Tanenbaum A. S., Computer Networks, Pearson (5 <sup>th</sup> Ed), 2013. Pbk.	1292024224	978-1292024226
<b>Other Texts</b>		
• Englander, The Architecture of Computer Hardware, Systems Software & Networking, Wiley (2 <sup>nd</sup> Ed), 2009.	0471715425	978-0471715429
<b>Other Reading</b>		
Students are expected to access a wide range of sources of information on IT hardware/software including journals, popular computer magazines, and the internet.		

## 9. Contact Points

### Email:

Customer Service team via [www.bcs.org/contact](http://www.bcs.org/contact)

### Phone:

UK: 01793 417424 or 0845 300 4417 (lo-call rate)

Overseas: +44 (0)1793 417424

Lines are open Monday to Friday, 08.15 a.m. to 5.45 p.m. UK time.

### Website:

[www.bcs.org/heg](http://www.bcs.org/heg)

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