

# **BCS Higher Education Qualifications**

## **Level 6 Knowledge based Systems**

Version 3.0

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	March 2014	Released
Version 2.0	March 2015	Re-formatted with syllabus numbering – no change to content
Version 3.0	Dec 2016	Regulation statement added.

## 2. Rationale

This module is designed to provide an overview of the Artificial Intelligence (AI) field with particular emphasis on knowledge representation. It will be of particular interest to candidates whose work requires them to build intelligent systems although no previous AI experience is expected. As well as covering the various mechanisms and systems used to represent knowledge, methodologies for knowledge engineering will be studied. The module also covers the emerging area of Adaptive Computing which includes the use of artificial neural networks and genetic algorithms

## 3. Aims

- To provide a thorough knowledge of the field of Artificial Intelligence
- To provide an understanding of the emerging approaches in AI and their implications for information engineering
- To provide a detailed awareness of the applications of AI in business and industry

## 4. Objectives

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

- Critically assess new developments in database technology
- Interpret and explain the impact of emerging database standards
- Discuss the typical approaches used in AI problem solving
- Compare and contrast various knowledge representation systems
- Discuss methodological and project management approaches to developing knowledge based systems
- Explain concepts used in adaptive computing and describe their application to problem solving
- Describe the major AI application areas and techniques used within them
- Describe examples of AI use in real situations and particularly on the Internet

## 5. Prior Knowledge Expected

### Professional Graduate Diploma in IT

The learner must have achieved the Diploma in IT or have an appropriate exemption to be entered for the Professional Graduate Diploma in IT.

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

### Professional Graduate Diploma in IT

The examination is a three-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	1.1	Basic concepts
	1.2	Definition of AI; Background and past achievements; Aims Overview of application areas
	1.3	Problems and problem solving
	1.4	State space search; Production rules; Logic
	1.5	Heuristic search techniques
	1.6	Generate and test; Hill climbing; Search reduction strategies
2	2.1	Representation models
	2.2	Predicate logic; rules; Semantic nets; Frames; Conceptual graphs;
	2.3	Scripts
	2.4	Fuzziness and uncertainty Security considerations
	2.5	Fuzzy logic; Statistical techniques for determining probability Methodologies for developing knowledge based systems
	2.6	The KBS Development Life Cycle; Knowledge acquisition/elicitation
	2.7	Management of KBS projects
	2.8	Prototyping; Implementation; Development environments
3	3.1	Neural networks
	3.2	Architectures; Hopfield network; Multi-layer perception
	3.3	Feedforward; Backpropagation
	3.4	Genetic algorithms
	3.5	Basic concepts; Population; Chromosomes; Operators;
	3.6	Schemata; Coding
	3.7	Rule induction
	3.8	Basic concepts; Decision trees/rule sets
4	4.1	Expert systems
	4.2	Natural language processing
	4.3	Machine vision and robotics
	4.4	Data mining and intelligent business support
	4.5	Internet based application

## 8. Recommended Reading List

Knowledge Based Systems	ISBN 10	ISBN 13
<b>Primary Texts</b>		
<ul style="list-style-type: none"><li>Peter Jackson, Introduction to Expert Systems, Addison-Wesley (3rd Ed), 1998</li></ul>	0201876868	978-0201876864
<b>Other Texts</b>		
<ul style="list-style-type: none"><li>Goldberg D. E., Genetic Algorithms in Search, Optimisation and Machine Learning, Addison-Wesley, 1989.</li></ul>	0201157675	978-0201157673
<ul style="list-style-type: none"><li>Michalski, Bratko, Kubat, Machine Learning and Data Mining, Wiley (3rd Ed), 1999. This publication is not only about Knowledge based Systems but also about data mining</li></ul>	0471971995	978-0471971993
<ul style="list-style-type: none"><li>Expert Systems: Principles and Programming (Hardcover) Publisher: Course Technology; 4Rev Ed edition (15 Oct 2004).</li></ul>	0534384471	978-0534384470
<ul style="list-style-type: none"><li>A Bradford, Knowledge Engineering and Management: The Common KADS Methodology, 2000. MIT Press</li></ul>	0262193000	978-0262193009

## 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/heq](http://www.bcs.org/heq)

**Post:** BCS, The Chartered Institute for IT  
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