BCS Certificate in Systems Modelling Techniques Syllabus

Version 3.5
December 2016

This professional certification is not regulated by the following United Kingdom Regulators - Ofqual, Qualification in Wales, CCEA or SQA
## 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.

<table>
<thead>
<tr>
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<th>Changes Made</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 3.5 December 2016</td>
<td>Strapline regarding regulated statement has been added</td>
</tr>
<tr>
<td>Version 3.4 March 2015</td>
<td>Updated language requirements for additional time and use of dictionaries.</td>
</tr>
<tr>
<td>Version 3.3 September 2012</td>
<td>Updated the Reasonable Adjustments Requirements and removed the Definitions of Terminology. Included a section to cover excerpts from BCS books</td>
</tr>
<tr>
<td>Version 3.2 August 2012</td>
<td>Added in details of extra time for foreign language candidates</td>
</tr>
<tr>
<td>Version 3.1 October 2011</td>
<td>Updated 3.2 Activity Diagrams from 25% to 10%. Updated title page</td>
</tr>
<tr>
<td>Version 3.0 August 2011</td>
<td>Updated ISEB to BCS logos and strapline. Added table of contents, levels of knowledge, levels of skill and responsibility, format of the examination, change history and definition of terminology. <strong>No change to structured approach</strong> Minor corrections to UML/OO approach. UML 2.0 specification added to reading list</td>
</tr>
<tr>
<td>V3.1 October 2011</td>
<td>Updated 3.2 Activity Diagrams from 25% to 10%. Updated title page</td>
</tr>
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BCS Certificate in Systems Modelling Techniques

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Introduction

The certificate is primarily concerned with modelling systems from a variety of perspectives. It requires candidates to construct three main types of model reflecting different perspectives and to describe the interactions between them.

The syllabus has two common sections (comprising 15% of the syllabus) and three others where the exam provider will need to select one of two approaches. It should be noted that the two approaches differ in one key area; the UML version does not include the concept of modelling the existing system whereas this is included in the Structured version.

Organisations are able to examine alternative approaches or techniques to those shown below. In this case, details of the standard to be examined, including a description of the principles and notation, should be submitted with the examination accreditation application.

Objectives

The candidate should be able to:

- Justify the need for IT system modelling and modelling techniques.
- Explain why it is important to model IT system requirements from different perspectives.
- Develop models of system functionality. These models should be either process models with supporting process descriptions or use case diagrams with supporting use case descriptions.
- Develop models of system data. These models should be either entity relationship models or analysis class models, both with supporting descriptions.
- Develop a dynamic model. This model should be either an entity life history showing the effect of events on an entity or a sequence diagram showing the realisation of a use case.
- Evaluate selected models against business objectives and system requirements.
- Appreciate how the selected models inter-relate with each other.
- Describe how the products of analysis feed into the design and development of a system.

Eligibility for the Examination

There are no specific pre-requisites for entry to the examination; however candidates should possess the appropriate level of knowledge to fulfil the objective shown above.

Format of the Examination

The format for the examination is a one hour written (open book) examination based on a business scenario with 15 minutes reading time.

Candidates who are awarded a pass for the examination are awarded the BCS Certificate in Systems Modelling Techniques.
Duration and Format of the Course

Candidates can study for this certificate in two ways: by attending training courses provided by BCS Examination Providers or by self-study. Training courses leading to the certificate should normally run for 21 hours. The course can be delivered a number of different ways from traditional class-room based training to online e-learning.

Additional time for candidates requiring Reasonable Adjustments due to a disability

Candidates may request additional time if they require reasonable adjustments in line with the BCS reasonable adjustments policy. It will be the Examination Provider’s responsibility to make a decision regarding candidate eligibility and keep a record of the decision. This is subject to audit by BCS.

Additional time for candidates whose language is not the language of the exam

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

If the examination is taken in a language that is not the candidate’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.

Excerpts from BCS Books

Examination Providers may include excerpts from BCS books in the course materials. If you wish to use excerpts from the books you will need a license from BCS to do this. If you are interested in taking out a licence to use BCS published material you should contact the Head of Publishing at BCS outlining the material you wish to copy and the use to which it will be put.
Syllabus

1. Systems Modelling (5%)
   1.1 The need for modelling and modelling standards
   1.2 Rationale for the selected approach
   1.3 The approach and Systems Development Lifecycle
   1.4 Place of models within the Systems Development Lifecycle
   1.5 Modelling the IT system from different perspectives
   1.6 Interaction of the selected models
   1.7 Validating and verifying models

2. Systems Modelling in Context (10%)
   2.1 Monitoring analysis against business objectives and system requirements
   2.2 The bridge to design, software package selection and development
3. Modelling Functionality (35%)

3.1. Use Case Modelling (25%)
- Modelling user requirements
- Use cases
- Actors and the system boundary
- Use case diagrams
- Generalising actors and use cases
- Use case descriptions – template of the description, including pre-conditions and post-conditions
- Use case descriptions – defining the main and alternative flows
- <<include>> and <<extend>>

3.2. Activity Diagrams (10%)
- Activity diagrams – notation
- Using activity diagrams to model processing
- Using activity diagrams to model use case descriptions

4. Static Modelling (25%)

4.1 Analysis class modelling rationale
4.2 Objects and classes
4.3 Class diagrams and object diagrams
4.4 Abstraction and encapsulation
4.5 Representing classes: name, attributes and operations
4.6 Defining attributes: adornments
4.7 Associations
  - Naming associations
  - Defining multiplicities (minimum and maximum)
  - Multiple associations
  - Reflexive associations
  - Constraints in associations
  - Association classes
  - Generalisation and inheritance
    - Modelling generalisation
    - Private, public and protected attributes
    - Concept of polymorphism

5. Dynamic Modelling (25%)

5.1 Use case realisation
5.2 Sequence diagrams
  - Lifelines
  - Focus
  - Message notation
  - Populating the class diagram
  - Using opt, alt and loop in the sequence diagram
5.3 State machine diagrams
5.4 Communication diagrams – an introduction
Structured Version

3. Modelling Functionality (35%)
3.1. Modelling processes using a Data Flow Diagram
   - Processes
   - External Entities
   - Datastores
   - Dataflows
   - Decomposition and levels
3.2. Elementary Process Descriptions
   - Documenting the processing
3.3. Types of Data Flow Diagrams – current and required

4. Static Modelling (30%)
4.1. Modelling data using Entity Relationship Diagrams
   - Entities
   - Relationships including cardinality, optionality, exclusivity, recursion, multiple, relationship names
4.2. Supporting Documentation
   - Entity descriptions
   - Relationship descriptions
   - Attribute descriptions

5. Dynamic Modelling (25%)
5.1. Analysing the behaviour of entities
   - Events
   - Enquiries
   - Effects
   - Entity Access Matrix
   - Modelling the behaviour of entities
   - Constructs for sequence, selection and iteration
5.2. Documenting navigation paths
Levels of Knowledge / SFIA Levels

This course will provide candidates 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 in on the website www.bcs.org/levels

The levels of knowledge above will enable candidates 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:

<table>
<thead>
<tr>
<th>Level</th>
<th>Levels of knowledge</th>
<th>Levels of skill and responsibility (SFIA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K7</td>
<td></td>
<td>Set strategy, inspire and mobilise</td>
</tr>
<tr>
<td>K6</td>
<td>Evaluate</td>
<td>Initiate and influence</td>
</tr>
<tr>
<td>K5</td>
<td>Synthesise</td>
<td>Ensure and advise</td>
</tr>
<tr>
<td>K4</td>
<td>Analyse</td>
<td>Enable</td>
</tr>
<tr>
<td>K3</td>
<td>Apply</td>
<td>Apply</td>
</tr>
<tr>
<td>K2</td>
<td>Understand</td>
<td>Assist</td>
</tr>
<tr>
<td>K1</td>
<td>Remember</td>
<td>Follow</td>
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</table>

Format of the Examination

<table>
<thead>
<tr>
<th>Type</th>
<th>Written examination based on a business scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>1 hour preceded by 15 minutes reading time. Candidates are entitled to an additional 15 minutes if they are sitting an examination in a language that is not their native/official language.</td>
</tr>
<tr>
<td>Pre-requisites</td>
<td>None</td>
</tr>
<tr>
<td>Supervised / Invigilated</td>
<td>Yes</td>
</tr>
<tr>
<td>Open Book</td>
<td>Yes</td>
</tr>
<tr>
<td>Pass Mark</td>
<td>50%</td>
</tr>
<tr>
<td>Distinction Mark</td>
<td>None</td>
</tr>
<tr>
<td>Delivery</td>
<td>Paper based examination</td>
</tr>
</tbody>
</table>
Recommended Reading List

Systems Modelling Techniques (Structured techniques version)

Title: Systems Analysis and Design (2nd Edition)
Author: Donald Yeates and Tony Wakefield
Publisher: FT Prentice Hall
Publication Date: 2003
ISBN: 9780273655361

Author: Philip Weaver, Nick Lanbrou and Matthew Walkley
Publisher: FT Pitman
Publication Date: 1998
ISBN: 9780273626756

Title: An Introduction to SSADM Version 4
Author: Caroline Ashworth and Laurence Slater
Publisher: McGraw-Hill
Publication Date: 1993
ISBN: 0077077253

Title: SSADM Version 4: A User’s Guide (Limited Availability)
Author: Malcolm Eva
Publisher: McGraw-Hill
Publication Date: 1994
ISBN: 0077079590

Title: SSADM Version 4: A Practical Approach
Author: Mike Goodland and Caroline Slater
Publisher: McGraw-Hill
Publication Date: 1995
ISBN: 007709073X

Systems Modelling Techniques (UML Version)

Title: Introducing Systems Development
Author: Steve Skidmore and Malcolm Eva
Publisher: Palgrave Macmillan
Publication Date: 2003
ISBN: 0333973690

Title: UML and the Unified Process
Author: Jim Arlow and Ila Neustadt
Publisher: Addison Wesley
Publication Date: 2005
ISBN: 978-0321321275

Title: Object – Oriented Systems Analysis and Design Using UML
Author: Simon Bennett, Steve McRobb and Ray Farmer
Publisher: McGraw Hill
Publication Date: 2005
ISBN: 0077092444
UML Specification
www.uml.com