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good for society**

# **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.

Version Number and Date	Changes Made
Version 3.5 December 2016	Strapline regarding regulated statement has been added
Version 3.4 March 2015	Updated language requirements for additional time and use of dictionaries.
Version 3.3 September 2012	Updated the Reasonable Adjustments Requirements and removed the Definitions of Terminology. Included a section to cover excerpts from BCS books
Version 3.2 August 2012	Added in details of extra time for foreign language candidates
Version 3.1 October 2011	Updated 3.2 Activity Diagrams from 25% to 10%. Updated title page
Version 3.0 August 2011	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. <b>No change to structured approach</b> Minor corrections to UML/OO approach. UML 2.0 specification added to reading list
V3.1 October 2011	Updated 3.2 Activity Diagrams from 25% to 10%. Updated title page

# 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

# UML Version

## 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](http://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:

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

## Format of the Examination

Type	Written examination based on a business scenario
Duration	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.
Pre-requisites	None
Supervised / Invigilated	Yes
Open Book	Yes
Pass Mark	50%
Distinction Mark	None
Delivery	Paper based examination

# Recommended Reading List

## Systems Modelling Techniques (Structured techniques version)

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

**Title:** Practical SSADM Version 4+ A Complete Tutorial Guide (2<sup>nd</sup> Edition)  
**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](http://www.uml.com)