

# **BCS Certificate in Requirements Engineering Extended Syllabus**

**Version 2.4**  
**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 2.4 December 2016	Strapline regarding regulated statement has been added
Version 2.3 March 2015	Updated language requirements for extra time and use of dictionaries. Minor updates made to the commentary. Standardised the trainer requirements
Version 2.2 September 2012	This is the first version of the extended RE syllabus. The version number is unchanged so that it is consistent with the existing RE syllabus. The syllabus has been extended to support the centralised RE examination. The original syllabus is defined in black and the extensions in red. A commentary has been added to aid candidates preparing for the centralised examination.

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## Introduction

The syllabus is structured around a five part framework for Requirements Engineering which is applied to a project initiated by an approved business case. The five elements of the framework are Requirements Elicitation, Requirements Analysis, Requirements Validation, Requirements Documentation and Requirements Management.

The syllabus requires that the candidate should be able to describe the objectives and techniques within each element of the framework.

This **extended** Requirements Engineering syllabus is designed to support the centralised requirements engineering examination paper. The original syllabus is defined in black and the extensions in red. A commentary has been added to aid candidates preparing for the centralised examination. There are numbers at the end of some bullet points which directly refer to points made in the commentary.

## Objectives

Holders of the BCS Certificate in Requirements Engineering should be able to:

- Explain the importance of linking requirements to the Business Case
- Describe the roles and responsibilities of key stakeholders in the requirements engineering process
- Explain the use of a range of requirements elicitation techniques and the relevance of the techniques to business situations
- Analyse, prioritise and organise elicited requirements
- Document requirements
- Identify problems with requirements and explain how requirements documentation may be improved
- Create a model of the features required from a system
- Interpret a model of the data requirements for an information system
- Describe the principles of Requirements Management and explain the importance of managing requirements
- Describe the use of tools to support Requirements Engineering
- Explain the process and stakeholders involved in Requirements Validation

## 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.

## 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. It is the view of BCS that, for full coverage to be achieved, 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.

## Duration and Format of the Examination

The format for the examination is a one hour written examination based on a business scenario preceded by 15 minutes reading time. The examination is open book (you can take written material into the examination room). Candidates need to achieve a minimum of 50% pass the examination. Candidates who are awarded a pass for the examination are awarded the BCS Certificate in Requirements Engineering.

## 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 examination

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.

It will be the Examination Provider's responsibility to make the decision regarding candidate eligibility and keep a record of the additional time allowed. Candidates must request additional time in advance of the examination to allow the Examination Provider enough time to make suitable arrangements with the invigilator.



# Syllabus

## 1. Introduction to Requirements Engineering (5%)

### 1.1 Framework for Requirements Engineering

- Rationale for Requirements Engineering and the problems with requirements
- The definition and characteristics of a requirement (1)
- The characteristics of a requirements engineering process (2)
- The problems of defining requirements (3)
- A framework for Requirements Engineering (4)
- Requirement Engineering activities – elicitation, analysis, validation, documentation and management
- The importance of requirements planning and estimating (5)

### 1.2 The business rationale and inputs

- The business analysis process model and the inputs into the 'define requirements' stage (6)
- The business case in the project lifecycle (7)
- Terms of Reference / Project Initiation Document / Project Charter – business objectives, project objectives, scope, constraints (budget, timescale, standards), sponsor (authority), resources and assumptions

## 2. Hierarchy of requirements (10%)

### 2.1 Building the hierarchy through decomposition of requirements (1)

### 2.2 Categories of requirements within the hierarchy (2)

- General business requirements, including legal and business policy
- Technical policy requirements
- Functional requirements
- Non-functional requirements, including performance, usability, access, security, archiving, backup and recovery, availability, robustness (3)

## 3. Stakeholders in the requirements process (5%)

### 3.1 The definition of the term 'stakeholder' (1)

### 3.2 Project Stakeholders: their role and contribution to the requirements engineering process (2)

- Project Manager
- Business Analysis
- Solution Developer
- Testers (3)
- Architects (4)

### 3.3 Business Stakeholders: their role and contribution to the requirements engineering process (5)

- Project Sponsor
- Subject matter expert
- End users and managers

### 3.4 External stakeholders: their role and contribution to the requirements engineering process (6)

- Customers
- Regulators
- Suppliers - products and services

#### **4. Requirements Elicitation (20%)**

##### **4.1 Knowledge types – tacit and non-tacit (explicit) (1)**

##### **4.2 Elicitation techniques**

For each elicitation technique; description of the technique (what it is), conduct of the technique (how it is performed); advantages of the technique, including situations where the technique is particularly appropriate, and disadvantages or drawbacks of the technique, including situations where the technique is not particularly appropriate.

- Interviews
- Workshops
- Observation:
  - Formal/informal
  - Shadowing
- Focus groups
- Prototyping
- Scenarios
- Document Analysis (2)
- Special purpose records
- Questionnaires
- Activity sampling

##### **4.3 Understanding the applicability of techniques (3)**

#### **5. Use of models in Requirements Engineering (10%)**

##### **5.1 The purpose of modelling requirements**

- Generating questions
- Cross-checking for consistency and completeness
- Defining business rules

##### **5.2 Modelling the business context for the system using a context diagram that identifies the inputs and outputs of the system**

##### **5.3 Developing a model to represent the system processing requirements**

Use case diagram – actors, boundaries, associations, use cases (1)

##### **5.4 Interpreting a data model based upon the system data requirements**

Class diagram – classes, simple associations, multiplicities, attributes (2)

## 6. Requirements Documentation (15%)

### 6.1 Documentation styles and levels of definition

- User Stories (1)
- Use Cases (2)
- Requirements List
- Requirements Catalogue

### 6.2 Requirements Catalogue

- Identifier
- Name
- Description
- Acceptance criteria
- Source
- Owner
- Rationale/Benefits
- Related non-functional requirements
- Priority
- Type (functional, non-functional, general, technical)
- Related requirements/documents
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- Version control/status
- Change history
- Resolution

### 6.3 Requirements Document (3)

- Introduction and Background
- Business Process Models
- Function models (use case diagram) of defined requirements
- Data model (class model) of defined requirements
- Requirements catalogue
- Glossary

## 7. Requirements Analysis (20%)

### 7.1 Prioritising and packaging requirements for delivery

The MoSCoW prioritisation scheme (1) and its role/purpose in planning the delivery of a system, its iterations or releases

### 7.2 Organising requirements

- Requirements filters (2)
- Characteristics of a good requirement (3)
- Removing duplicated requirements
- Reconciling overlapping requirements
- Identifying and negotiating conflicts between requirements
- Removing ambiguity
- Ensuring feasibility (technical, business and financial)
- Ensuring testability
- Ensuring traceability

### 7.3 Prototyping requirements

### 7.4 Verifying requirements (4)

## 8. Requirements Validation (5%)

### 8.1 Agreeing the requirements document

The requirements validation process; plan review, issue documentation, review documentation, collect comments, undertake actions, revise documentation

### 8.2 Types of reviews (1)

- Informal reviews
- Structured walkthroughs (author-led review)
- Technical reviews
- Inspections

### 8.3 Stakeholders and their areas of concern (2)

Project sponsor, end user representatives, subject matter expert (domain expert) business analyst, developers, testers, project office representatives.

## 9. Requirements Management (10%)

### 9.1 Dealing with changing requirements

- The sources of change (1)
- Change Management (2)
- Configuration management (3)

### 9.2 The importance of traceability

- Vertical traceability (to business objectives)
- Horizontal traceability (from origin to deliver)

### 9.3 Traceability and ownership

### 9.4 Requirements Engineering support tools (4)

- CARE Tools (Computer Aided Requirements Engineering)
- CASE Tools (Computer Aided Software Engineering)

## 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.

# Extended Syllabus Commentary

## Section 1: Introduction to Requirements Engineering

- 1) The definition of a requirement may be found in the IIBA BaBOK.
- 2) A requirements engineering process would typically define the responsibilities of key stakeholders, suggest the separation of elicitation, analysis and validation, stress links to the business context of the project, promote organised requirements documentation, emphasise testable requirements, stress requirements traceability, employ industry-standard modelling techniques and promote the use of visualisation techniques such as prototyping.
- 3) Typical problems with requirements are defined in the BCS Business Analysis publication.
- 4) A framework for Requirements Engineering is presented in the BCS Business Analysis publication.
- 5) Only an appreciation of the importance of planning and estimating is required. A detailed consideration of project planning and use of published estimating models is not required.
- 6) The business analysis process model and inputs into the 'define requirements' stage is presented in the BCS Business Analysis publication.
- 7) Detailed consideration of what is in a business case is not required. The project lifecycle of a business case is presented in the BCS Business Analysis publication.

## Section 2: Hierarchy requirements

- 1) This is concerned with the principle of hierarchy and its potential use in decomposition.
- 2) This classification is defined in detail in the BCS Business Analysis publication.
- 3) An examinable list of non-functional requirements is provided in the BCS Business Analysis publication.

## Section 3: Stakeholders in the requirements process

- 1) The term stakeholder is defined as someone who has an interest in the system or business change under consideration.
- 2) Project stakeholders are discussed in the BCS Business Analysis publication.
- 3) Project stakeholders include testers from the perspective of validating testable requirements and testing the software that purports to fulfil those requirements.
- 4) Solution Architects will particularly contribute to the technical requirements of the project.
- 5) Business stakeholders are discussed in the BCS Business Analysis publication.
- 6) This is a sub-set of the external stakeholders discussed in the BCS Business Analysis publication.

#### Section 4: Requirements Elicitation

- 1) The distinction between knowledge types is made in the BCS Business Analysis publication.
- 2) This means the analysis of documents used in the process (for example; a delegate booking form used in a training course system), it does not mean reviewing existing documentation describing the business processes or system under review.
- 3) This is largely covered by the extended information given in 4.2. However, candidates must be able to select appropriate techniques to elicit requirements in the context of a given scenario. A candidate relationship between techniques and knowledge types is given in the BCS Business Analysis publication.

#### Section 5: Use of models in Requirements Engineering

- 1) Different types of actor (user roles, time, another system), use cases (including a definition of the different types of event that can initiate a use case (external input, time, internal), boundary of the system, simple associations between actors and use cases. There is no requirement to understand <<include>> and <<extend>> constructs.
- 2) Simple business classes (such as Employee, Payment, Invoice etc) and how they are related to each other through associations. Understanding business rules through interpreting multiplicities (min..max). Definition of attributes. There is no requirement to understand operations and associations such as generalisation and associated concepts of inheritance and polymorphism.

#### Section 6: Requirements Documentation

- 1) User stories should at least identify the 'who, why and what' of a requirement. For example; **As a** ... (role or actor) (*Who*), **I want** ... (what capability or feature is required) (*What*), **so that** ... (why is it of business value or benefit) (*Why*)
- 2) Use cases need to identify the use case name, actor, pre-conditions, triggering event, use case steps (with alternatives and exceptions), post-conditions or success guarantees.
- 3) The contents of a Requirements Document are discussed in the BCS Business Analysis publication.

#### Section 7: Requirements Analysis

- 1) The MoSCoW prioritisation scheme is associated with an agile approach to systems development. For the purpose of this syllabus, both M(ust) have and S(hould) have requirements are mandatory. Must have requirements must be delivered in the initial software release, but Should have requirements can be delayed to a later software release. The C stands for C(ould) and, the W for W(on't have this time).
- 2) Requirements filters are defined in the BCS Business Analysis publication.
- 3) Characteristics of a good requirement are defined in the BCS Business Analysis publication. A good requirement can also be defined as one that is SMART – which in this context is specific, measurable, achievable, relevant and time-framed. The usefulness of the acronym is improved if two of the letters are used flexibly. The T might also stand for testable (measurable). The R might also stand for realistic (achievable).
- 4) This concerns checking performed by requirements (business) analysts, rather than the stakeholders undertaking the requirements validation review.

#### Section 8: Requirements Validation

- 1) The types of review are introduced in the ISTQB Software Testing syllabus. Formal reviews are a formal fault identification process with a focus on finding, documenting and categorising faults, not apportioning blame. The characteristics of these four types of reviews is explored in Hambling et al, *Software Testing*, BCS Publications, pp62-63.
- 2) The focus here is on how stakeholders contribute to the validation process. The potential contribution of stakeholders to requirements validation is discussed in the BCS Business Analysis publication.

#### Section 9: Requirements Management

- 1) Sources of requirements change includes changes in organisational focus and strategy, changes in significant stakeholders, changes in technical possibilities or technical constraints, deterioration in the financial performance of the organisation. Changes in the external environment (for example; enactment of a new law, deterioration in the economy) may also impact the project.
- 2) Change control is discussed in the BCS Business Analysis publication.
- 3) Configuration management is discussed in the BCS Business Analysis publication.
- 4) Only a simple distinction is required here, between features offered by tools that focus on requirements documentation and management (CARE) and features offered by tools that also possess functions to support requirements modelling (CASE).



## 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 at [www.bcs.org/levels](http://www.bcs.org/levels)

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

## Format of the Examination

Type	Scenario based examination based on a combination of complex multiple choice and short answer questions
Duration	1 hour preceded by 15 minutes reading time. Candidates are entitled to an additional 15 minutes if they are sitting the examination in a language that is not their native/official language.
Pre-requisites	None, although accredited training is strongly recommended
Supervised / Invigilated	Yes
Open Book	Yes
Pass Mark	60%
Distinction Mark	None
Delivery	Paper based examination

## Trainer Criteria

Criteria	<ul style="list-style-type: none"><li>• Hold the BCS Certificate in Requirements Engineering</li><li>• Have 10 days training experience or hold a train the trainer qualification</li><li>• Have a minimum of 3 years practical experience in requirements engineering</li></ul>
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## Classroom Size

Trainer to candidate ratio	1:16
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## Reading List

**Title:** Business Analysis (2<sup>nd</sup> Edition)  
**Author:** Debbie Paul, Donal Yeates and James Cadle  
**Publisher:** BCS Learning and Development  
**Publication Date:** 2010  
**ISBN:** 9781906124618  
**URL:** <http://shop.bcs.org>

**Title:** Mastering the Requirements Process  
**Author:** Suzanne Robertson and James Robertson  
**Publisher:** Addison Wesley  
**Publication Date:** 1999  
**ISBN:** 978-0201360462

**Title:** Writing Effective Use Cases  
**Author:** Alistair Cockburn  
**Publisher:** Addison-Wesley  
**Publication Date:** October 2000  
**ISBN:** 0201702258

**Title:** User Stories Applied: For Agile Software Development  
**Author:** Mike Cohn  
**Publisher:** Addison Wesley  
**Publication Date:** March 2004  
**ISBN:** 9780321205681

**Title:** Requirements Engineering: Processes and Techniques  
**Author:** Gerald Kotonya and Ian Sommerville  
**Publisher:** John Wiley & Sons  
**Publication Date:** April 1998  
**ISBN:** 0471972088

**Title:** Use Case Modeling  
**Author:** Kirt Bittner and Ian Spence  
**Publisher:** Addison Wesley  
**Publication Date:** August 2002  
**ISBN:** 9780201709131

**Title:** Business Analysis Techniques: 72 Essential Tools for Success  
**Author:** James Cadle, Debbie Paul and Paul Turner  
**Publisher:** BCS  
**Publication Date:** February 2010  
**ISBN:** 9781906124236  
**URL:** <http://shop.bcs.org>

**Title:** Writing Better Requirements  
**Author:** Ian F Alexander and Richard Stevens  
**Publisher:** Addison-Wesley  
**Publication Date:** 2002  
**ISBN:** 0321131630

**Title:** Scenarios, Stories and Use Cases  
**Author:** Ian Alexander and Neil Maiden  
**Publisher:** John Wiley and Sons  
**Publication Date:** 2004  
**ISBN:** 0470861940

**Title:** Requirements by Collaboration  
**Author:** Ellen Gottesdiener  
**Publisher:** Addison Wesley  
**Publication Date:** April 2002  
**ISBN:** 9780201786064