BCS LEVEL 5 DIPLOMA IN IT

SYSTEMS ANALYSIS AND DESIGN

SYLLABUS

bcs
The Chartered Institute for IT

CONTENTS

Introduction

The second stage within the BCS three-stage Higher Education Qualification programme, the Level 5 Diploma enables candidates who have already achieved the Level 4 Certificate in IT to progress to higher levels of knowledge and competency.

This internationally-recognised qualification introduces you to the business-related aspects of the IT industry, developing your technological expertise while also considering the potential challenges of the day-to-day running of an organisation, such as legal obligations and intellectual property.

Our modules have been created in-line with the latest developments in the industry, giving you a competitive edge in the IT job market. You will have the opportunity to learn about object-oriented programming, user experience, systems analysis and design, as well as to build upon knowledge and skills developed during the Level 4 Certificate.

To successfully achieve the qualification, candidates need to complete:

*   One core module
*   Three optional modules
*   One Professional Project in IT

Candidates who wish to progress onto the next stage will need to complete the Project at end of the Level 6 Professional Graduate Diploma in IT.

Systems Analysis and Design Optional Module

The Systems Analysis and Design module is an optional module that forms part of the Level 5 Diploma in IT – the second stage within the BCS three-stage Higher Education Qualification programme.

Candidates will explore the context of systems analysis and design, gain an understanding of what stakeholder analysis is and how data on stakeholder requirements can be elicited. Candidates will learn about systems analysis techniques and tools, logical data design and basic object-oriented design concepts.

Qualification Suitability and Overview

Candidates must have achieved the Certificate in IT or have an appropriate exemption to be entered for the Diploma in IT. Candidates can study for this diploma by attending a training course provided by a BCS accredited Training Provider or through self-study, although 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.

The Level 5 Diploma is suitable for professionals wishing to gain a formal IT qualification, and this module may be particularly relevant for candidates interested in career opportunities such as business analysis, systems architecture, or consultancy.

Total Qualification Time (Certificate)	Guided Learning Hours (Module)	Assessment Time (Exam)
1086 hours	225 hours	Two hours

SFIA Levels

This award provides candidates with the level of knowledge highlighted within the table, enabling candidates to develop the skills to operate successfully at the levels of responsibility indicated.

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

SFIA Plus

This syllabus has been linked to the SFIA knowledge skills and behaviours required at Level 5.

BUAN3

Investigates operational needs and problems, and opportunities, contributing to the recommendation of improvements in automated and non-automated components of new or changed processes and organisation. Assists in defining acceptance tests for these recommendations.

REQM3

Defines and manages scoping, requirements definition and prioritisation activities for small-scale changes and assists with more complex change initiatives. Follows agreed standards, applying appropriate techniques to elicit and document detailed requirements. Provides constructive challenge to stakeholders as required. Prioritises requirements and documents traceability to source. Reviews requirements for errors and omissions. Provides input to the requirements base-line. Investigates, manages and applies authorised requests for changes to base-lined requirements, in line with change management policy.

DESN4

Designs components using appropriate modelling techniques following agreed architectures, design standards, patterns and methodology. Identifies and evaluates alternative design options and trade-offs. Creates multiple design views to address the concerns of the different stakeholders of the architecture and to handle both functional and non-functional requirements. Models, simulates or prototypes the behaviour of proposed systems components to enable approval by stakeholders. Produces detailed design specification to form the basis for construction of systems. Reviews, verifies and improves own designs against specifications.

HCEV3

Applies tools and methods to design and develop users' digital and off-line tasks, interactions and interfaces to meet agreed usability and accessibility requirements for selected system, product or service components. Creates workable prototypes. Assists, as part of a team, on overall user experience design. Assists in the evaluation of design options and trade-offs. Consistently applies visual design and branding guidelines.

Further detail around the SFIA Levels can be found at www.bcs.org/levels.

Learning Outcomes

Upon completion of this module, candidates will be able to:

- Describe different lifecycle models and explain the contributions of systems analysis and design within them.
- Discuss various approaches to systems analysis and design and explain their strengths and weaknesses.
- Evaluate the tools and techniques of systems analysis and design that may be used in a given context.
- Use appropriate methods and techniques to produce an analysis of a given scenario.
- Use appropriate methods and techniques to produce a system design for a given scenario.
- Provide suitable documentation for systems analysis and design activities.

Syllabus

1. The context of systems analysis and design

Learners will be able to:

1.1 Explain the systems development lifecycle.

Indicative content

a. Life cycle
b. Position of systems analysis and design (SAD) within life cycle

Guidance

Candidates should be able to describe the various stages in systems development.

1.2 Describe the role of business analysts, system analysts and system architects.

Indicative content

a. Business analysts
b. System analysts
c. System architects

Guidance

Candidates should be able to describe the different ways in which these roles contribute to the systems development life cycle.

1.3 Explain the characteristics and purpose of systems analysis.

Indicative content

a. Design methods and methodologies, including agile approaches, such as:
    i. Atern/DSDM Dynamic Systems Design Method
    ii. XP eXtreme Programming

Guidance

Candidates should have an appreciation for and be able to describe different design methodologies.

1.4 Explain the adaption of methodologies.

Indicative content

a. Adaptation of methodologies to deal with the circumstances of a development or application environment
b. Adoption and/or adaptation of existing software solutions

Guidance

Candidates should be able to appreciate that sometimes different approaches are necessary and should understand and be able to explain the need to adapt.

2. Requirements elicitation and business analysis

Learners will be able to:

2.1 Explain stake holder analysis.

Indicative content

a. Primary stakeholders
b. Secondary stakeholders
c. Tertiary stakeholders

Guidance

Candidates should be able to understand the importance of identifying different stakeholders and considering their needs.

2.2 Describe requirements gathering techniques.

Indicative content

a. Interviews
b. Surveys
c. Questionnaires
d. Focus groups

Guidance

Candidates need to be able to describe different techniques for establishing user requirements.

2.3 Describe prioritisation of requirements.

Indicative content

a. Differing requirements for stakeholders, such as:
   i. Cost
   ii. Timescale, etc.

Guidance

Candidates need to understand that it is unlikely that every requirement of every stakeholder will be met, so there will need to be prioritisation and compromise.

2.4 Explain categorisation of requirements.

Indicative content   **Guidance**

a. Differences between function   Candidates need to be able to identify requirements, differentiate
    and quality requirements   between requirements that address the functionality of a system
                                          and those that ensure the quality of the end product.

2.5 Explain gap analysis.

Indicative content   **Guidance**

a. Actual performance   Candidates should be able to explain techniques for analysing the
b. Potential or desired   difference between what the management information system is
    performance   delivering and the business needs.

2.6 Explain the use of business case and feasibility studies.

Indicative content   **Guidance**

a. Cost benefit analysis   Candidates should be able to explain the need for establishing a
                                          business case, any systems development, and the role of feasibility
                                          studies.

2.7 Describe business activity modelling.

Indicative content   **Guidance**

a. Including the use of data flow   Candidates will be expected to develop data flow diagrams from a
    diagrams (DFDs)   case study.

2.8 Explain the use of prototyping.

Indicative content   **Guidance**

a. Including as a method of   Candidates should be able to understand various uses for
    requirements elicitation   prototyping and different prototyping methods and types.

---

3. Systems analysis techniques and tools

Learners will be able to:

3.1 Demonstrate use cases and scenarios.

Indicative content

a. Use cases
b. Actors
c. Use case diagrams

Guidance

Candidates should be able to develop use cases. In the exam, candidates may be asked to draw these, or to take a theoretical approach.

3.2 Identify events.

Indicative content

a. Business events
b. Signal events
c. Temporal events

Guidance

Candidates should understand how events are used in systems analysis and be able to identify examples.

3.3 Explain use case realisation.

Indicative content

a. A brief introduction to interaction diagrams:
   i. Communication diagrams
   ii. Sequence diagrams

Guidance

Candidates should understand how events are used in systems analysis and be able to identify examples.

3.4 Describe entity relationship modelling (ERM).

Indicative content

a. Entity-relationship diagrams (ERDs)

Guidance

Candidates should be able to develop an entity relationship model from a case study.

3.5 Describe cross referencing functions.

Indicative content

a. Cross-referencing functions to data entities via Create/ Delete/Update/Delete tables

Guidance

Candidates should be able to produce Create/Delete/Update tables.

3.6 Describe activity diagrams.

Indicative content

a. Purpose and notation of activity diagrams.

Guidance

Candidates should be able to develop an activity diagram for a given scenario.

4. Logical data design

Learners will be able to:

4.1 Explain the conversation of ERM to relational schema.

Indicative content

a. The basic rules of conversion

Guidance

Candidates should understand how ERM (ERD in particular) can be converted to a relational schema, e.g. relational data base tables.

4.2 Describe normalisation and denormalisation.

Indicative content

a. First normal form (1NF)
b. Second normal form (2NF)
c. Third normal form (3NF)

Guidance

Candidates will be expected to explain normalisation and denormalisation, and to carry out the normalisation of unnormalised data.

4.3 Explain validation rules and other data base constraints.

Indicative content

a. Database validation rules
b. Database constraints

Guidance

Candidates should be able to understand the importance of validation rules and other data base constraints and give suitable examples.

4.4 Explain views in data bases.

Indicative content

a. Views vs tables in databases

Guidance

Candidates should be able to understand database views and explain their advantages.

4.5 Explain object-relational mapping.

Indicative content

a. Mapping from a UML class model to the RDB schema model:
   i.   Mapping classes
   ii. Mapping associations
   iii. Mapping aggregations
   iv. Mapping inheritance/ generalisations

Guidance

Candidates should be able to explain how various elements of a class diagram can be mapped to relational database (RDB) tables.

---

5. Object-oriented (OO) design

Learners will be able to:

5.1 Explain OO concepts.

Indicative content

a. Classes and objects
b. Encapsulation
c. Interfaces
d. Inheritance
e. Polymorphism
f. Message passing

Guidance

Candidates are expected to explain these OO concepts using examples.

5.2 Demonstrate relating objects, associations and aggregations.

Indicative content

a. Relationships between classes/objects:
   i.   Association
   ii. Aggregation
   iii. Generalisation/

   inheritance

Guidance

Candidates are expected to explain and illustrate these relationships between classes, e.g. by using examples from a case study.

5.3 Explain static modelling.

Indicative content

a. UML class diagrams

Guidance

Candidates are expected to explain the main elements of class diagrams and to draw class diagrams.

5.4 Explain dynamic modelling.

Indicative content

a. Including UML interaction diagrams, e.g.:
   i. Sequence
   ii. Communication/ collaboration diagrams
c. UML state charts

Guidance

Candidates should be able to explain and draw all these diagrams.

---

6. Interaction design

Learners will be able to:

6.1 Describe usability issues.

Indicative content

a. Ease of use
b. Fitness for business purpose

Guidance

Candidates should be able to explain the main factors influencing usability of software systems.

6.2 Explain interface design.

Indicative content

a. Main rules of user interface (UI) design
b. Process and main steps of UI design

Guidance

Candidates should be able to explain the main rules of UI design and identify its main activities.

Examination Format

This module is assessed through completion of an invigilated written exam.

Type	Four written questions from a choice of six, each with equal marks
Duration	Two hours
Supervised	Yes
Open Book	No (no materials can be taken into the examination room)
Passmark	10/25 (40%)
Delivery	Paper format only

Adjustments and/or additional time can be requested in line with the BCS reasonable adjustments policy for candidates with a disability or other special considerations.

Question Weighting

Candidates will choose four questions from a choice of six. All questions are equally weighted and worth 25 marks.

Recommended Reading

Primary texts

Title: Information systems development: methodologies, techniques and tools (fourth edition)
Author: D. Avison and G. Fitzgerald
Publisher: McGraw-Hill
Date: 2006
ISBN: 978-0077114176

Title: Object-oriented systems analysis and design using UML (fourth edition)
Author: S. Bennett, S. McRobb and R. Farmer
Publisher: McGraw-Hill
Date: 2010
ISBN: 978-0077125363

Title: Systems analysis and design: an object-oriented approach with UML (fifth edition)
Author: A. Dennis, B. H. Wixom and D. Teagarten
Publisher: Wiley
Date: 2015
ISBN: 978-1118804674

Title: Requirements Analysis and System Design: developing information systems with UML (third edition)
Author: L. A. Maciaszek
Publisher: Addison Wesley
Date: 2001
ISBN: 978-0321440365

Using BCS Books

Accredited Training Organisations 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 request a license, please contact the Head of Publishing at BCS outlining the material you wish to copy and its intended use.

Document 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	Changes Made
Version 1.0 July 2021	Document Creation

CONTACT

For further information please contact:

BCS
The Chartered Institute for IT
3 Newbridge Square
Swindon
SN1 1BY

T +44 (0)1793 417 445

www.bcs.org

bcs

The
Chartered
Institute
for IT