BCS PRACTITIONER CERTIFICATE IN SYSTEMS MODELLING AND DEVELOPMENT
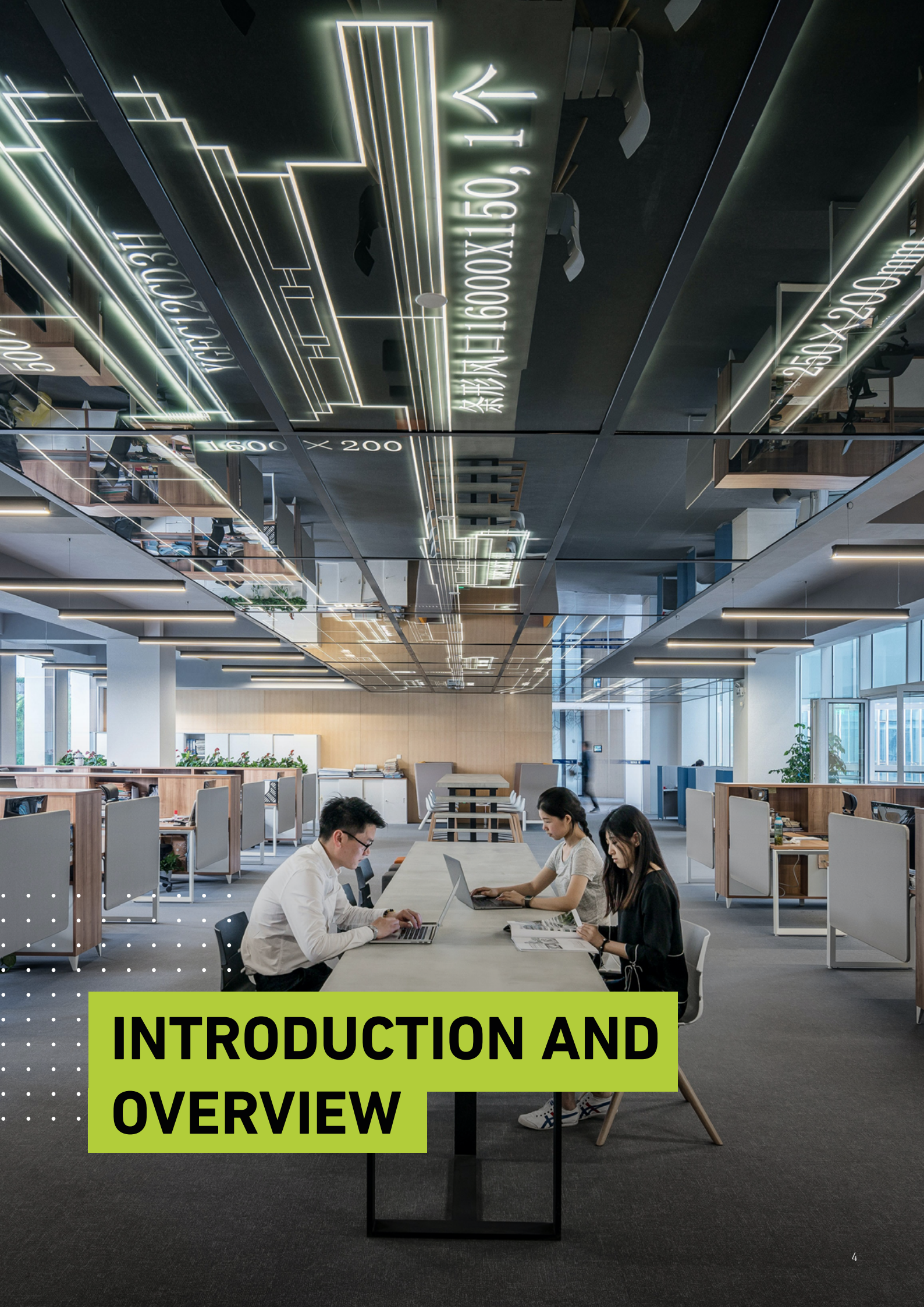## SYLLABUS

SOLUTION DEVELOPMENT PORTFOLIO

This professional award is not regulated by the following United Kingdom Regulators – Ofqual, Qualifications Wales, CCEA or SQA.

CONTENTS

INTRODUCTION AND OVERVIEW

INTRODUCTION

Modelling and developing systems encompasses a wide range of roles and responsibilities. At one end, modelling and creating abstract representations is required to help understand complex systems. Developing systems then transforms the abstract into reality through the application of industry-standard models and processes.

The BCS Practitioner Certificate in Modelling and Developing Systems covers a wide-range of topics. Job roles related to this certificate include analysts, designers, developers, testers, and technical architects.

This certificate is suitable for those who currently work in a systems modelling and/or development role and are looking to enhance their understanding of industry-standard methodologies.

LEARNING OUTCOMES

Upon completion of this certificate, candidates will be able to demonstrate a practical understanding of:

- team structures, roles and responsibilities, and additional considerations related to modelling and developing systems

- industry-standard methods of developing systems

- development practices and approaches (including considerations related to bespoke vs. off-the-shelf solutions)

- process modelling (e.g. use case, sequence, etc.)

- mapping data structures (including the evaluation of class and structure diagrams)

- objects, states, timing and state diagrams

- methods of justifying approach and impacts of design decisions

QUALIFICATION SUITABILITY AND OVERVIEW

Centres must ensure that candidates have the potential and opportunity to gain the qualification successfully. It is advised that candidates hold a minimum of 3 years' experience in a related role. The candidate should also have a good standard of English and Maths.

This is a practitioner certificate which will:

- assess the candidate's ability to identify, describe, and explain key concepts
- assess the candidate's ability to apply and analyse key principles, methods, and tools to specific scenarios
- enable candidate's to progress in their professional development

Candidates can study for this award by attending a training course provided by a BCS accredited training provider or through self-study.

TOTAL QUALIFICATION TIME	GUIDED LEARNING HOURS	INDEPENDENT LEARNING	ASSESSMENT TIME
29 hours	18 hours	10 hours	60 minutes

TRAINER CRITERIA

It is recommended that to deliver this certificate effectively, trainers should possess:

- ten days of training experience or have a Train the Trainer qualification
- a minimum of 3 years of practical experience in the subject area

SFIA LEVELS

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

LEVEL	LEVELS OF KNOWLEDGE	LEVELS OF SKILLS 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

For further information regarding the SFIA Levels
SFIA*plus* | BCS Levels

This syllabus has been linked to the SFIA knowledge, skills and behaviours required at level 4 for an individual working in the following subject areas.

KSB01

Acquiring a proper understanding of a problem or situation by breaking it down systematically into its component parts and identifying the relationships between these parts. Selecting the appropriate method/tool to resolve the problem and reflecting critically on the result, so that what is learnt is identified and assimilated.

KSC84

Understanding and application of different development approaches e.g. iterative/ incremental methodologies (agile, XP, TDD, SCRUM) or traditional sequential methodologies (waterfall or V-model). Irrespective of development methodology a DevOps approach may also be taken where development and operational staff work collaboratively.

KSC01

Technical or functional understanding of commercial off-the-shelf (COTS) applications and/or other bespoke software deployed in the organisation in order to provide system configuration, audit, technical and/or functional support.

KSC87

Managing the processes, systems and functions to package, build, test and deploy changes and updates which are bounded as releases into the pre-production or production environment; concession management on acceptance of level of non-conforming release items.

KSCA6

The collaborative approach consisting of agile practices, processes and procedures designed to facilitate rapid IT service and product delivery. DevOps emphasises people (and culture) and seeks to improve collaboration between development (Dev) and operations (Ops) teams with the aim of shortening the systems development lifecycle to provide continuous release of high-quality software.

KSD01

Methods, tools and techniques to analyse and optimise processes in order to improve the quality of a product or service

KSD11

Relevant national and international legislation.

KSD28

Principles, methods and techniques for establishing, documenting, and maintaining standards.

SYLLABUS

1. INTRODUCTION
(10%)

1.1 Identify the actors/roles and responsibilities within system development.

Indicative content

a. Analysts
b. Designers
c. Developers
d. Testers
e. Technical architects

Guidance

Candidates should be able to identify the roles and responsibilities of analysts, designers, developers, testers, and technical architects.

1.2 Describe the typical team structures for a computing-related project.

Indicative content

a. Matrix versus hierarchical
b. Mapping to agile

Guidance

Candidates should be able to identify team compositions for a project from a given scenario. This includes describing matrix and hierarchical team structures, and the identification of agile frameworks.

1.3 Explain the differences between a business analyst and a systems analyst.

Indicative content

a. Interface between business IT.
b. IT-focus

Guidance

Candidates should be able to explain the differences between a business and a technical analyst and the role of each.

1.4 **Discuss relevant legal and ethical considerations with respect to computing projects.**

Indicative content

a. Legal
b. Ethical
c. Copyright
d. Licensing

Guidance

Candidates should be able to discuss legal and ethical considerations. Candidates should also be able to discuss the main duties in relation to the BCS code of conduct.

2. SYSTEMS DEVELOPMENT LIFECYCLES (20%)

2.1 Explain the concepts of initial software lifecycles.

Indicative content

a. Waterfall
b. Agile
c. Phased delivery
d. Iterative
e. Minimum level version 4+ of SSADM

Guidance

Candidates should be able to identify the key elements of software lifecycles. For example, how is each approach commonly used, what documents are commonly used, and why are hybrid / Agile methods popular.

2.2 Explain what are spiral, iterative, and incremental development styles.

Indicative content

a. Time driven
b. Risk driven
c. Simple vs. complex scenarios

Guidance

Candidates should be able to explain number of steps, ease of rollback, risk management, and how each style has a different focus on delivery.

2.3 Discuss what is meant by an Agile approach and the Agile Manifesto.

Indicative content

a. Scrum
b. Show and tell
c. 12 principles
d. 4 Values

Guidance

Candidates should be able to discuss the key aspects of an Agile approach. This includes, identifying the values and approaches to agile. In addition, candidates should be able to identify specific agile events (e.g. sprint backlog).

2.4 **Discuss the key of elements of RAD and how they could be used in an Agile development project.**

Indicative content

a. Timeboxing
b. Parallel development
c. JRP
d. JAD

Guidance

Candidates should be able to discuss the key elements of RAD. Specifically, candidates will be expected to explain how RAD addresses specific concerns, and how it is commonly used and how best practice can be applied.

2.5 **Analyse scenarios and apply specific solutions development lifecycles (SDLC).**

Indicative content

a. Data centric
b. Political
c. User-centred
d. SSADM, Agile, RAD, Soft Systems, Waterfall.

Guidance

Candidates should be able to consider which SDLC approach is most appropriate. Areas of consideration consist of, project size, budget, existing processes, and regulatory considerations.

3. DEVELOPMENT PRACTICES (10%)

3.1 Analyse the use of bespoke and off-the-shelf development practice.

Indicative content

a. Cost
b. Time considerations
c. Legacy systems
d. Available skills
e. Time constraints
f. Risk management

Guidance

Candidates should be able to identify the advantages and disadvantages of off-the-shelf vs. bespoke software. They should also be able to choose a specific approach based on a specific scenario.

3.2 Discuss hybrid approaches to systems modelling and development.

Indicative content

a. Selection of best parts of Waterfall or Agile
b. Time to implement
c. Fast delivery to customers

Guidance

Candidates should be able to explain the advantages and disadvantages of hybrid approaches.

3.3 Describe the merits of various types of prototyping.

Indicative content

a. Incremental
b. Evolutionary
c. Throwaway

Guidance

Candidates should be able to explain the benefits of prototyping and describe the benefits of the different approaches to prototyping.

4. PROCESS MODELLING (20%)

4.1 **Apply knowledge of use cases to identify actors, roles, and interactions between each other and / or external systems.**

Indicative content

a. Use case diagrams

Guidance

Candidates will be expected to understand the main features of use case diagrams. This includes the identification of actors, roles, and interactions. For example, candidates should be able to identify the actor of a use case diagram based on a specific scenario.

4.2 **Describe the main elements of sequence diagrams**

Indicative content

a. Sequence diagrams
b. Standardised notation

Guidance

Candidates should be able to describe the main elements of sequence diagrams. This includes, how and when they are used, and the benefits of their use.

4.3 **Describe the main elements of activity diagrams and the flow of actions.**

Indicative content

a. Business processes
b. Nodes (e.g. start, activity/action, fork, end)

Guidance

Candidates should be able to describe identify the main elements of an activity diagram and describe their purpose. This includes, how and when they are used and the benefits of their use.

5. DATA MODELLING (15%)

5.1   Identify the main elements of class diagrams, classes, attributes, and behaviours.

Indicative content

a.   Classes
b.   Attributes
c.   Behaviours
d.   Instances
e.   Interfaces
f.   Visibilities

Guidance

Candidates should be able to identify the main features of class diagrams. This includes the identification of specific behaviours, attributes, and classes in a given example.

5.2   Analyse the use of class diagrams, interfaces, tables, associations, generalisations.

Indicative content

a.   Tables
b.   Associations
c.   Generalisations
d.   Aggregation
e.   Inheritance

Guidance

Candidates should be able to demonstrate the data model to use in differing scenarios. For example, candidates will be expected to analyse a given scenario and identify the salient element of a class diagram.

5.3   Describe the issues related to mapping relational table structures / models.

Indicative content

a.   Class types (e.g. persistent vs. transient)
b.   Methods of mapping
c.   Issues of mapping

Guidance

Candidates should be able to describe the challenges of mapping to a relational table. Specifically, candidate should be able to identify specific challenges, and what can and can not be easily implemented in a relational database structure.

6. EVENT / DYNAMIC MODELLING (15%)

6.1 **Discuss the behaviour of single object and what compound states are.**

Indicative content

a. State (machine) diagrams
b. States (atomic, sequential, complete, machine).

Guidance

Candidates should be able to interpret the different object attributes and how each one affects an object. They should also be able to identify common examples of when state machine diagrams can be applied.

6.2 **Explain how timing diagrams show the change in state of an item over time.**

Indicative content

a. Timing diagrams

Guidance

Candidates need to be able to explain the main elements of timing diagrams. This includes how and when timing diagrams can be used and how they relate to other models.

7. METHODS
(10%)

7.1 **Discuss the structure and content of a chosen method / methodology.**

Indicative content

a. SDLC lifecycles
b. Sequence of events

Guidance

Candidates must be able to list various frameworks and to explain the elements of a particular framework or approach. This includes the order of phases in a typical development approach.

7.2 **Explain issues with converting a logical module into a physical development.**

Indicative content

a. Reserve words
b. Inconsistent mapping
c. Limitations of logical modules

Guidance

Candidates need to be able to explain the challenges of translating logical models into physical development. This includes explaining the limitations of logical modules and how to mitigate against them.

7.3 **Discuss the impacts of design decisions.**

Indicative content

a. Cognitive bias
b. Accessibility
c. Interoperability
d. Supportability

Guidance

Candidates should be able to understand the pros and cons of designs and explain when and what scenarios a certain decision may impact a project. For example, they should consider how design decisions can impact cost, accessibility, etc.

EXAMINATION FORMAT

This award is assessed by completing an invigilated online exam that candidates will only be able to access at the date and time they are registered to attend.

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, including English as a second language.

TYPE

40
MULTIPLE-CHOICE/
MULTIPLE-RESPONSE
QUESTIONS

DURATION

60 MINUTES

SUPERVISED

YES
THIS AWARD WILL BE
SUPERVISED

OPEN BOOK

NO
(NO MATERIALS CAN
BE TAKEN INTO THE
EXAMINATION ROOM)
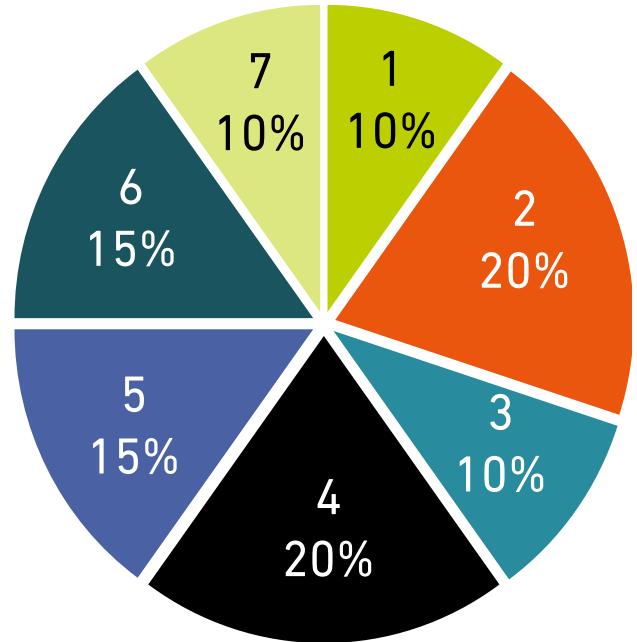
PASS MARK

(65%)
26/40

DELIVERY

DIGITAL FORMAT ONLY

QUESTION WEIGHTING

Each major subject heading in this syllabus is assigned a percentage weighting. The purpose of this is:

- Guidance on the proportion of content allocated to each topic area of an accredited course.

- Guidance on the proportion of questions in the exam.

Syllabus Area

1	Introduction
2	Systems Development Lifecycles
3	Development Practices
4	Process Modelling
5	Data Modelling
6	Event / Dynamic Modelling
7	Methods

Question Type

Multiple-choice questions/ Multiple Response questions

RECOMMENDED READING

The following titles are suggested reading for anyone undertaking this award.
Candidates should be encouraged to explore other available sources.

TITLE:	Software Development in Practice
AUTHOR:	Bernie Fishpool, Mark Fishpool
PUBLISHER:	BCS, The Chartered Institute for IT
PUBLICATION DATE:	*2020*
ISBN:	*978-1-78017-4976*

TITLE:	Modelling Business Information: Entity relationship and class modelling for Business Analysts
AUTHOR:	Keith Gordon
PUBLISHER:	BCS, The Chartered Institute for IT
PUBLICATION DATE:	*2017*
ISBN:	*978-1-78017-3535*

USING BCS BOOKS

Accredited Training Organisations may include excerpts from BCS books in the course materials. If you wish to use quotes from the books, you will need a licence from BCS. To request an appointment, please get in touch with the Head of Publishing at BCS, outlining the material you wish to copy and the use to which it will be put.

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	**Syllabus created.**

REFERENCES

Gordon, K. (2017). Modelling Business Information: Entity relationship and class modelling for Business Analysts. [Swindon]: BCS, The Chartered Institute for IT.

Fishpool, B., Fishpool, M. Software Development in Practice. [Swindon]: BCS, The Chartered Institute for IT.

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