Preparation Guide

Edition 202409

Content

1. Overview

EXIN BCS Artificial Intelligence Essentials (AIE.EN)

Scope

The EXIN BCS Artificial Intelligence Essentials certification confirms that the professional understands basic principles and terminology of artificial intelligence (AI) and knows the benefits and risks of AI / machine learning.

This certification includes the following topics:

- Introduction to artificial intelligence (AI) and historical development
- Ethical and legal considerations
- Enablers of AI
- Finding and using data in AI
- Using AI in your organization
- Future planning and impact – human plus machine

Summary

Artificial intelligence (AI) has boomed in popularity and use in recent years and is now widely used. It is transforming industry and the future of technology by enabling systems to learn and mimic human intelligence.

The EXIN BCS Artificial Intelligence Essentials certification provides an introduction into key AI terminology and tools and what they mean for society. The preparation guide covers the following aspects of AI: its history, ethical and sustainable AI challenges, key AI enablers like data, and the future of AI- human interaction in the workplace.

This certification offers a broad yet straightforward first step into navigating the constantly evolving AI landscape.

Context

The EXIN BCS Artificial Intelligence Essentials certification is part of the EXIN BCS Artificial Intelligence qualification program.

Target group

The EXIN BCS Artificial Intelligence Essentials certification is suitable for individuals with an interest in exploring the basic functions and abilities of AI, and how these could impact an organization.

Roles with a particular interest may be:

- developers
- project managers
- product managers
- chief information officers
- chief finance officers
- change practitioners
- business consultants
- leaders of people

Requirements for certification

- Successful completion of the EXIN BCS Artificial Intelligence Essentials exam.

Examination details

Examination type:	Multiple-choice questions
Number of questions:	20
Pass mark:	65% (13/20 questions)
Open book:	No
Notes:	No
Electronic equipment/aides permitted:	No
Exam duration:	30 minutes

The Rules and Regulations for EXIN's examinations apply to this exam.

Bloom level

The EXIN BCS Artificial Intelligence Essentials certification tests candidates at Bloom levels 1 and 2 according to Bloom's revised taxonomy:

- Bloom level 1: Remembering – relies on recall of information. Candidates will need to absorb, remember, recognize and recall.
- Bloom level 2: Understanding – a step beyond remembering. Understanding shows that candidates comprehend what is presented and can evaluate how the learning material may be applied in their own environment. This type of questions aims to demonstrate that the candidate is able to organize, compare, interpret and choose the correct description of facts and ideas.

Training

Contact hours

The recommended number of contact hours for this training course is 6. This includes group assignments, exam preparation and short breaks. This number of hours does not include lunch breaks, homework and the exam.

Indication study effort

28 hours (1 ECTS), depending on existing knowledge.

Training organization

You can find a list of our Accredited Training Organizations at www.exin.com.

2. Exam requirements

The exam requirements are specified in the exam specifications. The following table lists the topics of the module (exam requirements) and the subtopics (exam specifications).

Exam requirements	Exam specifications	Weight
1. An introduction to artificial intelligence (AI) and historical development		**15%**
	1.1 State the definitions of key AI terms	
	1.2 Identify key milestones in the development of AI	
	1.3 Identify different types of AI	
2. Ethical and legal considerations		**15%**
	2.1 Identify the role of ethics in AI	
	2.2 State key ethical concerns in AI	
	2.3 Identify guiding principles in the use of ethical AI	
3. Enablers of AI		**15%**
	3.1 List common examples of AI	
	3.2 Identify robotics in AI	
	3.3 Describe machine learning	
	3.4 Identify common machine learning concepts	
4. Finding and using data in AI		**20%**
	4.1 State key data terms	
	4.2 Identify the characteristics of data quality	
	4.3 State the risks associated with handling data in AI	
	4.4 Identify data visualization techniques and tools	
	4.5 State key generative AI terms	
	4.6 Identify the use of data in the machine learning process	
5. Using AI in your organization		**20%**
	5.1 Identify opportunities for AI in your organization	
	5.2 Identify project management approaches	
	5.3 Identify governance activities associated with implementing AI	
6. Future planning and impact – human plus machine		**15%**
	6.1 Describe the roles and career opportunities presented by AI	
	6.2 Identify AI uses in the real world	
	6.3 Identify AI's impact on society	
	6.4 Describe the future of AI	
	Total	**100%**

Exam specifications

1 An introduction to artificial intelligence (AI) and historical development

The candidate can…

1.1 state the definitions of key AI terms.

Indicative content

a. Human intelligence - "The mental quality that consists of the abilities to learn from experience, adapt to new situations, understand and handle abstract concepts, and use knowledge to manipulate one's environment."
b. Artificial intelligence (AI) - "Intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals."
c. Machine learning - "The study of computer algorithms that allow computer programs to automatically improve through experience."
d. Scientific method - "An empirical method for acquiring knowledge that has characterized the development of science."

Guidance

To build their understanding of AI, it is essential for candidates to recognize the definitions of the key AI terms listed.

1.2 identify key milestones in the development of AI.

Indicative content

a. Asilomar principles
b. Dartmouth conference of 1956
c. AI winters
d. Big data and the Internet of Things (IoT)
e. Large language models (LLMs)

Guidance

Candidates will be able to identify these key milestones in the evolution of AI. Asilomar principles are a set of guidelines for responsible AI development. The Dartmouth conference, which took place in 1956, is considered to be the starting point of AI as a field of practice. Candidates should understand the concept of an AI winter, which began in the 1980s through to the rise of big data and the development of generative AI.

Big data refers to the access to enormous amounts of data from a wide variety of sources, including social media, sensors, and other connected devices. Candidates should understand the widespread use of LLMs in 2022, which made AI a matter of public interest like never before.

1.3 identify different types of AI.

Indicative content

a. Narrow/weak AI
b. General/strong AI

Guidance

Candidates will be able to identify examples of narrow AI (weak AI) and general AI (strong AI).

Narrow AI (ANI) also known as weak AI, is task- specific and operates within well-defined domains. Examples include: image recognition, speech recognition, language translation and virtual assistants.

General AI (AGI) also known as strong AI aims to replicate human intelligence. It is the hypothetical intelligence of a machine that has the capacity to understand or learn any intellectual task that a human being can understand or learn.

2 Ethical and legal considerations

The candidate can…

2.1 identify the role of ethics in AI.

Indicative content

a. What is ethics?

b. Differences between ethics and law

Guidance

AI offers huge opportunities, however there are also commonly held ethical concerns about its increasingly widespread use.

Ethics are the moral principles that govern a person's behavior or the conducting of an activity.

Candidates will be able to state the general definition of ethics and recognize the differences between ethics and law.

2.2 state key ethical concerns in AI.

Indicative content

a. Ethical concerns of AI:

- Potential for bias, unfairness and discrimination
- Data privacy and protections
- Impact on employment and the economy

Guidance

Candidates will be able to state and identify common ethical concerns in the use of AI, such as the potential for bias in training data leading to biased output, data protection and privacy concerns, and the long-term impact on jobs.

2.3 identify guiding principles in the use of ethical AI.

Indicative content

a. UK AI Principles and other relevant legislation

- Safety, security and robustness
- Transparency and explainability
- Fairness
- Accountability and governance
- Contestability and redress

b. AI governance models including ISO 42001

Guidance

Candidates will be able to identify the key principles and models as listed.

3 Enablers of AI

The candidate can…

3.1 list common examples of AI.

Indicative content

a. Human compatible

b. Internet of Things (IoT)

c. Generative AI tools

Guidance

There are countless examples of AI in everyday life, and candidates should be able to list examples of those outlined.

3.2 identify robotics in AI.

Indicative content

a. Definition of robotics: “a machine that can carry out a complex series of tasks automatically, either with or without intelligence.”
b. Intelligent or non-intelligent
c. Types of robots:
- Industrial
- Personal
- Autonomous
- Nanobots
- Humanoids

d. Robotic process automation (RPA)

Guidance

Candidates should be able to state the definition of robots as outlined.

They should know that RPA refers to a machine that can carry out a complex series of tasks automatically, either with or without intelligence, usually with a goal of improving processes.

Various types of robots exist, and candidates should be familiar with each of these.

3.3 describe machine learning.

Indicative content

a. Machine learning - “The field of machine learning is concerned with the question of how to construct computer programs that automatically improve with experience.” (Tom Mitchell)
b. Deep learning - a multi-layered neural network.

Guidance

Candidates should understand that machine learning is a subset of AI, and that deep learning is a type of machine learning.

AI itself is not a new concept; machine learning is another step in the evolution of AI. Machine learning is used within data science and is the application of algorithms to derive insight from data and big data.

3.4 identify common machine learning concepts.

Indicative content

a. Prediction
b. Object recognition
c. Classification
d. Clustering
e. Recommendations

Guidance

Machine learning can be used in several contexts to complete different types of tasks. Candidates should be encouraged to explore different examples and applications of machine learning.

4 Finding and using data in AI

The candidate can…

4.1 state key data terms.

Indicative content

a. Big data - “extremely large data sets that may be analyzed computationally to reveal patterns, trends, and associations.” (Dialogic.com)
b. Data visualization - “the representation of data through use of common graphics, such as charts, plots, infographics and even animations.” (IBM)
c. Structured data is data files organized sequentially or organized serially in a tabular format.
d. Semi-structured data is data that does not follow the tabular structure of a relational database but does have some defining or organizational properties which allow it to be analyzed.
e. Unstructured data is data that does not follow any pre-defined order or structure.

Guidance

Candidates should be able to identify the key terminologies listed and recognize them in context.

4.2 identify the characteristics of data quality.

Indicative content

a. Five data quality characteristics:

- Accuracy - is it correct?
- Completeness - is it all there?
- Uniqueness - is it free from duplication?
- Consistency - is it free from conflict?
- Timeliness - is it current and available?

Guidance

Candidates should be able to list the five characteristics of good quality data and the importance of each. Good quality data, which demonstrates all five of these characteristics, provides accurate information about its subject, and in turn, this helps to inform good decision making and reliable business intelligence.

4.3 state the risks associated with handling data in AI.

Indicative content

a. Bias
b. Misinformation
c. Processing restrictions
d. Legal restrictions

Guidance

Throughout the data lifecycle, there are various risks to consider, including how data is legally gathered and stored, to ensuring it is processed in line with its intended use, and is free from bias or misinformation.

Candidates should be aware of these risks and recognize examples of them in context.

4.4 identify data visualization techniques and tools.

Indicative content

a. Written
b. Verbal
c. Pictoral
d. Sounds
e. Dashboards and infographics
f. Virtual and augmented reality

Guidance

Data visualization is required to format data in a manner which is meaningful and digestible to the intended audience. Good data visualization means that data can be consumed, analyzed, summarized, and used easily, which supports decision making.

4.5 state key generative AI terms.

Indicative content

a. Generative AI - "Refers to deep-learning models that can generate high-quality text, images, and other content based on the data they were trained on." (IBM)
b. Large language models (LLMs) - "Deep learning algorithms that can recognize, summarize, translate, predict, and generate content using very large datasets." (IBM)

Guidance

Candidates should be able to state the definitions of generative AI and LLM and identify them in use.

4.6 identify the use of data in the machine learning process.

Indicative content

a. Stages of the machine learning process:

- Analyze the problem
- Data selection
- Data pre-processing
- Data visualization
- Select a machine learning model (algorithm)
  - Train the model
  - Test the model
  - Repeat (learning from experience to improve results)
- Review

Guidance

The machine learning process allows us to define the solution based on the problem that has been identified through the process of data selection, pre-processing, visualization and testing of data with specific algorithms.

5 Using AI in your organization

The candidate can…

5.1 identify opportunities for AI in your organization.

Indicative content

a. Opportunities for automation
b. Repetitive tasks
c. Content creation – generative AI

Guidance

Candidates should be able to identify simple opportunities for AI in an organization, such as an opportunity to automate a process, or minimize the human input into a repetitive task.

5.2 identify project management approaches.

Indicative content

a. Agile
b. Waterfall
c. Hybrid

Guidance

Candidates should be able to identify the key characteristics of these project management approaches and their suitability for a given project.

5.3 identify governance activities associated with implementing AI.

Indicative content

a. Compliance
b. Risk management
c. Lifecycle governance

Guidance

The three areas that governance must address are: compliance to satisfy regulations; risk management to proactively detect and mitigate risk; and lifecycle governance to manage, monitor and govern AI models.

(10 things governments should know about responsible AI, IBM 2024)

6 Future planning and impact – human plus machine

The candidate can…

6.1 describe the roles and career opportunities presented by AI.

Indicative content

a. AI-specific roles including: machine learning engineer, data scientist, AI research scientist, computer vision engineer, natural language processing (NLP) engineer, robotics engineer, AI ethics specialist, AI anthropologist.
b. Opportunities for existing roles.

- Additional training and knowledge
- Improved efficiency
- Automation

Guidance

AI is a rapidly evolving field, and new roles emerge regularly.

Candidates will be able to describe the various career opportunities evolving in this field – they will not be assessed on the names or duties of specific job roles.

6.2 identify AI uses in the real world.

Indicative content

a. Marketing
b. Healthcare
c. Finance
d. Transportation
e. Education
f. Manufacturing
g. Entertainment
h. IT

Guidance

AI tools and services are now part of the real world.

Candidates will be able to describe practical examples of AI applications in different sectors.

6.3 identify AI's impact on society.

Indicative content

a. Benefits of AI
b. Challenges of AI
c. Potential problems with AI
d. Societal impact
e. Environmental impact – sustainability, climate change and environmental issues
f. Economic impact – Job losses, retraining for new AI roles

Guidance

AI is evolving rapidly. This rapid technological advancement comes with benefits and challenges at societal level. Candidates should be able to identify these benefits and challenges and their impact on society.

Benefits include: reducing human error through task automation, processing and analyzing vast amounts of data for informed decisions (AI algorithms) and AI-powered tools in assistance in medical diagnosis.

Challenges include ethical concerns about algorithm bias and privacy, job loss, lack of creativity and empathy, security risks from hacking, socio-economic inequality, market volatility because of AI-driven trading algorithms and AI systems rapid self-improvement.

6.4 describe the future of AI.

Indicative content

a. Human and machine working together – augmented roles
b. Near and long-term developments in AI e.g., increased business automation, chatbots and digital assistants
c. Ethical AI

Guidance

The future of AI will continue to be shaped by technological advancements e.g., increase in data availability, better algorithms, higher computing power.

Candidates should be able to identify examples of potential future advancement and direction of AI.

3. Levels of Knowledge / SFIA Levels

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

Level	Levels of Knowledge	Levels of Skills and Responsibility (SFIA)
K7		Set strategy, inspire and mobilize
K6	Evaluate	Initiate and influence
K5	Synthesize	Ensure and advise
K4	Analyze	Enable
K3	Apply	Apply
K2	Understand	Assist
K1	Remember	Follow

SFIA Plus

This syllabus has been linked to the SFIA knowledge, skills and work activities required at level 2 for an individual working in the following subject areas.

KSCA5	The ability to harvest, clean, curate, manage, process and manipulate data in a variety of formats.
KSCA8	Knowledge and understanding of the development of intelligent agents, able to mimic cognitive functions, react to stimuli, and improve automatically through experience and the use of data.
KSD21	Methods and techniques for the assessment and management of business risk including safety-related risk.

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

4. e-CF mapping

All e-Competence Framework competences related to the EXIN BCS Artificial Intelligence Essentials certification can be found below. Also indicated is the level of the competence and whether the competence is covered entirely, partially or superficially. For more information about the e-CF, please visit http://www.itprofessionalism.org or contact EXIN.

Competence is covered Partial coverage Superficial coverage

e-Competence Level		1	2	3	4	5
A.10.	User Experience					
B.6.	Systems Engineering					
D.7.	Data Science & Analytics					
E.3.	Risk Management					
E.7.	Business Change Management					

5. Literature

Exam literature

The knowledge required for the exam is covered in the following literature:

A. Andrew Lowe and Steve Lawless
Artificial Intelligence Foundations: Learning from experience
BCS (February 2021)
ISBN: 978 1780 1752 87

B. Mark Pesce
Getting Started with ChatGPT and AI Chatbots: An introduction to generative AI tools
BCS (December 2023)
ISBN: 978 1780 1764 13

Contact EXIN

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