

GENERATIVE AI V1.0 SYLLABUS

BCS FOUNDATION AWARD

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

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INTRODUCTION AND OVERVIEW

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INTRODUCTION

Generative AI is rapidly becoming one of the most exciting and influential technologies today. It can create realistic digital art, write sophisticated text, and enhance various business processes.

Generative AI represents a major shift in organisations- how they operate, interact with customers, and develop new products and services. As more organisations adopt AI solutions, understanding how generative AI works and how to use it is essential for individuals and organisations. The BCS Foundation Award in Generative AI provides a solid introduction to this advanced technology.

This award is an ideal introduction for anybody wishing to understand the basics of using generative AI, its future potential, and the associated ethical and legal concerns.

LEARNING OUTCOMES

- The meaning of AI, including its history and key principles.
- The legal, ethical and regulatory considerations when using Al.
- How humans can use AI to support business activities.
- How to identify opportunities for AI and implement them.
- The impact of AI on the future of society and business.



QUALIFICATION SUITABILITY AND OVERVIEW

The BCS Foundation Award in Generative Artificial Intelligence is suitable for individuals with an interest in exploring the functions and abilities of generative AI, and the implications of its use.

Roles with a particular interest may be: content creators, designers, developers, project managers, product managers, copywriters, chief information officers, change practitioners, business consultants and leaders of people.

There are no specific entry requirements for this exam, although prior achievement of the BCS Essentials Certificate in Artificial Intelligence or a BCS Award from the Artificial Intelligence Pathway would be advantageous. Candidates can study for this award by attending a training course provided by a BCS accredited Training Provider or through self-study.

This award counts towards achieving your Foundation Certificate in AI and/or your Foundation Diploma in AI.

- To receive the Foundation Certificate in AI, you need to achieve four awards one award from each of the categories listed here (<u>https://www.bcs.org/media/qd5dotas/ai-pathway-24.png</u>)
- To receive the Foundation Diploma in AI, you need to achieve eight awards in total one or more award from each of the categories listed here (<u>https://www.bcs.org/media/qd5dotas/ai-pathway-24.png</u>)

Once you have achieved this, please contact your training provider or, if you are a self-study candidate, BCS. Your certificate will then be processed.

TOTAL QUALIFICATION	GUIDED LEARNING	INDEPENDENT	ASSESSMENT TIME
TIME	HOURS	LEARNING	
30 hours	12 hours	17.5 hours	30 minutes



TRAINER CRITERIA

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

- Hold the BCS Foundation Certificate in Artificial Intelligence V2.0 **or** BCS Foundation Award in Generative AI.
- Have 3 years experience of work or study in a related subject.
- Have teaching or training experience.

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

SFIA**PLUS**

This syllabus has been linked to the SFIA knowledge, skills and work activities required at level 2 and 3 for an individual working in the following subject areas.

DENG2WA0928	KSCA8	BINT2WA0937
Adheres to information handling procedures and follows relevant standards, policies and legislation in handling data.	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.	Assists in the application of appropriate safeguards to the handling of data and any analysis results.
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Click <u>HERE</u> further information regarding the SFIA Levels.

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SYLLABUS

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1. WHAT IS GENERATIVE AI? 25% K2

1.1 Describe key generative AI terms.

Indicative content

- Artifical intelligence (AI) Intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals.
- b. Generative artificial intelligence (Gen AI) Deeplearning models that can generate high-quality text, images and other content based on the data they were trained on.
- Large language models (LLMs) Deep learning algorithms that can recognise, summarise, translate, predict, and generate content using very large datasets.

- d. Natural language processing (NLP) The ability of a computer program to understand human language as it is spoken and written.
- e. Prompts The inputs or queries that a user or a program gives to an LLM AI, in order to elicit a specific response from the model.
- f. Completion The output or result generated by the AI after processing and understanding the provided prompt.

Guidance

Candidates will be able to recognise and recall the definitions of key generative AI terminology as listed.

1.2 Describe common uses of generative Al.

Indicative content

- a. For personal or organisational use.
- b. Respond to queries, improving search.
- c. Content creation.
- d. Summarise documents.
- e. Text to image, image to text.
- f. Following instructions.
- g. Writing computer programs.

Guidance

Generative AI is used in an enormous variety of tasks in social and work environments with varying levels of success, risk and responsibility.

Candidates should be able to recognise and describe the use of generative AI in context such as answering simple text-based questions, creating reports, summarising large volumes of text, writing accessibility text to describe images or writing code to program a computer.

1.3 Describe the role of machine learning in generative AI.

Indicative content

- a. Machine learning The study of computer algorithms that allow computer programs to automatically improve through experience.
- b. Deep learning A multi-layered neural network.
- c. Stages of the Machine Learning process:
 - Analyse the problem.
 - Data Selection.
 - Data Pre-processing.
 - Data Visualisation.
 - 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, visualisation and testing of data with specific algorithms.

There is no defacto method within Machine Learning, learning through experience is vitally important to generative AI, to help improve the quality and relevance of the output. Testing involves creating the correct test data, creating bodies of data to learn from and parameters for what you wish to test.



2. HOW GENERATIVE AI WORKS 25% K2

2.1 Describe the stages of the generative AI process.

Indicative content

- a. Testing.
- b. Training.
- c. Reinforcement learning.
- d. Reinforcement learning from human feedback. (RLHF).
- e. Inferencing.

Guidance

Learners should be able to describe each of the stages of the generative AI process as listed.

The model is firstly trained using vast data sets, then tested using controlled, unseen data. Then, reinforcement learning takes place, where the AI learns from the perceived quality of its output or response, and uses this to improve its output in future. This takes place in RLHF, where human operators pose thousands of prompts to the AI model, checking the response, then 'rewarding' the AI model for correct responses.

Inferencing is when a trained and tested AI model is fed new data, and prompted to generate a response, such as a prediction or recommendation.

2.2 Explain the use of data in generative AI.

Indicative content

- a. Training data including pre-training data.
- b. Test data.

Guidance

In generative AI, good quality training and testing data is incredibly valuable. The training data is used to train the model, while the testing data is used to evaluate its accuracy.

Training data is used to feed the AI model enormous banks of information, which it then

uses to construct a response to a prompt. Pretraining data is the first batch of data which is fed to the model, without any refinement or fine tuning. Training data is the term used to describe the data used thereafter, which is more focused or specific. The quality of the data used for training has a direct impact on the quality of the generated output.

Test data is unseen data – data which has not been used in any training capacity – which is used to assess the performance and output of the AI model.



Indicative content

- a. To make predictions.
- b. Required for long responses.

Guidance

Transformers help to provide more accurate predictions about the next most likely word, phrase, sentence, and even paragraphs in response to a prompt. A transformer provides the capability for lengthy responses – running into thousands of words – although those responses might not be accurate.

2.4 Describe the role of feedback in generative AI.

Indicative content

- a. Supervised fine tuning. (SFT)
- b. Reinforcement learning from human feedback. (RLHF)

Guidance

Candidates should understand the role of both RLHF and SFT in providing feedback on the responses of generative AI.

In SFT, the desired response to a prompt is created by a human and this response is used as training data.

In RLHF, human operators pose thousands of prompts and carefully check the response, 'rewarding' the chatbot for correct responses.

This is an ongoing process - constant fine tuning, this is why we see constant improvement.



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3. PROMPTING GENERATIVE AI 10% K2

3.1 Explain the role of prompts.

Indicative content	Guidance
a. To request an output.b. Prompt engineering.	A prompt is the instruction given to the generative Al model by the user. It powers the transformer – which looks at the prompt, at the training data, and at what it's generating at the same time. This is why a slight change to the prompt or how it is worded can affect the output.
	Prompt engineering is the art of altering and refining prompts, to reach a desired, or better quality output.

3.2 Describe types of prompts and their uses.

Indicative content

- a. Zero-shot, one shot, few shot.
- b. Character.
- c. Chain of thought.

Guidance

Zero-shot prompts are short, basic prompts with no additional instruction or context.

Character prompts are when the AI is asked to create the output in a particular tone or style, based on characteristics such as a given character, time period, or geographical location.

Chain of thought prompts are more complex problems, which require multi-level reasoning in order to construct a response.

The more examples you include, the better the output.

4. VALIDATING AND CHECKING THE OUTPUT 15% K2

4.1 Describe the need to quality check the output of generative AI.

Indicative content

- a. Human verification.
- b. Fact checking.
- c. Checking cited sources.

Guidance

Generative AI is capable of "hallucinations". This is when an output presents false or misleading information as fact, often the result of an ambiguous prompt. Examples of this are citing false sources, biased information, or false positives.

This creates a need for human fact verification and fact checking, to ensure that any AI generated output which is being used or shared is correct and fit for purpose.

4.2 Explain methods used to validate the output of generative AI.

Indicative content

- a. Subject matter experts.
- b. Reword the prompt to compare output.

Guidance

Actions can be taken to assess the validity of generative AI output. Reviews by subject matter experts can be used to identify errors, bias or false information.

Prompt engineering can also be used in validation. By giving the same instruction, worded in a different way, humans can assess if the generated outputs match and are consistent, allowing any discrepancies to be investigated. This method would still require human input.

5. ETHICAL AND LEGAL CONCERNS 25% K2

5.1 Describe the ethical considerations when developing generative AI.

Indicative content

- a. Data sources:
 - Malicious.
 - Commercially sensitive.
- b. Bias.
- c. Inaccuracies and false information.

Guidance

In the development of generative AI, consideration must be given to the potential ethical concerns of the data being used for training, and the output this creates.

Learners must consider the sources of data being used for training and testing and their reliability. For example, if data comes from a source with a particular political or moral stance, it is likely to contain bias and false or misleading information. Equally, commercially sensitive or personal data should not be used to train AI, and this could contain information which poses a risk to individuals or organisations if shared.

Using ethically questionable data to train and test AI could lead to poor output, containing bias or false information.

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



5.2 Describe the legal and regulatory considerations when developing generative AI.

Indicative content

- a. Copyright.
- b. Plagiarism.
- c. Data storage and use.
- d. Data security and privacy.

Guidance

Learners should be aware of both the legal and regulatory items to consider when developing and using generative AI.

In developing generative AI, the use and storage of data must be compliant with relevant legislation, such as UK Data Protection Act, UK GDPR and Privacy and Electronic Communications Regulations (PECR). If working outside of the UK, consideration must be given to the specific legislation relevant to the country of operation.

In using AI, learners should consider the input and output of the AI model, and always check the output for use of copyrighted content. The data used in the prompt should also be considered – as data entered into a generative AI model cannot be guaranteed to be secure. Private, legally protected or commercially sensitive data should not be used in prompts.

Organisational guidelines and policies should also be adhered to.

5.3 Explain how to mitigate against common AI risks.

Indicative content

- a. Reverse search the output.
- b. Prompt quality.
- c. Keep humans involved.

Guidance

Steps can be taken to minimise the risks presented by generative AI, learners should be able to explain and suggest suitable mitigations.

Reverse-searching the output of the AI model can be used to identify if the content already exists somewhere online, this can be helpful in identifying copyrighted or plagiarised content. Improving the quality of the prompt input can help to avoid hallucinations and can significantly improve the quality and relevance of the output. Human input throughout the use of generative AI is key to mitigating and minimising risk, as common sense and expertise can be applied to the prompt, the output and the application or implementation of it.

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 <u>BCS reasonable adjustments policy</u> for candidates with a disability or other special considerations, including English as a second language.

TYPE

20 MULTIPLE CHOICE QUESTIONS DURATION

30 MINUTES

SUPERVISED

YES THIS AWARD WILL BE SUPERVISED

OPEN BOOK

NO

(NO MATERIALS CAN BE TAKEN INTO THE EXAMINATION ROOM)



(65%) 13/20



ONLINE FORMAT ONLY

QUESTION WEIGHTING

Each primary 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









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RECOMMENDED READING

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

TITLE:	Getting Started with ChatGPT and AI Chatbots: An introduction to generative AI tools
AUTHOR:	Mark Pesce
PUBLISHER:	BCS
PUBLICATION DATE:	December 2023
ISBN:	9781780176413

TITLE:	Artificial Intelligence Foundations: Learning from experience
AUTHOR:	Andrew Lowe and Steve Lawless
PUBLISHER:	BCS
PUBLICATION DATE:	February 2021
ISBN:	9781780175287

Note - second edition due for publication October 2024.



USING BCS BOOKS

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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 and the changes made. The purpose is to identify quickly what changes have been made.

VERSION NUMBER	CHANGES MADE
Version 1.0	Document created.
Version 1.1	Updated information on module credits.

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