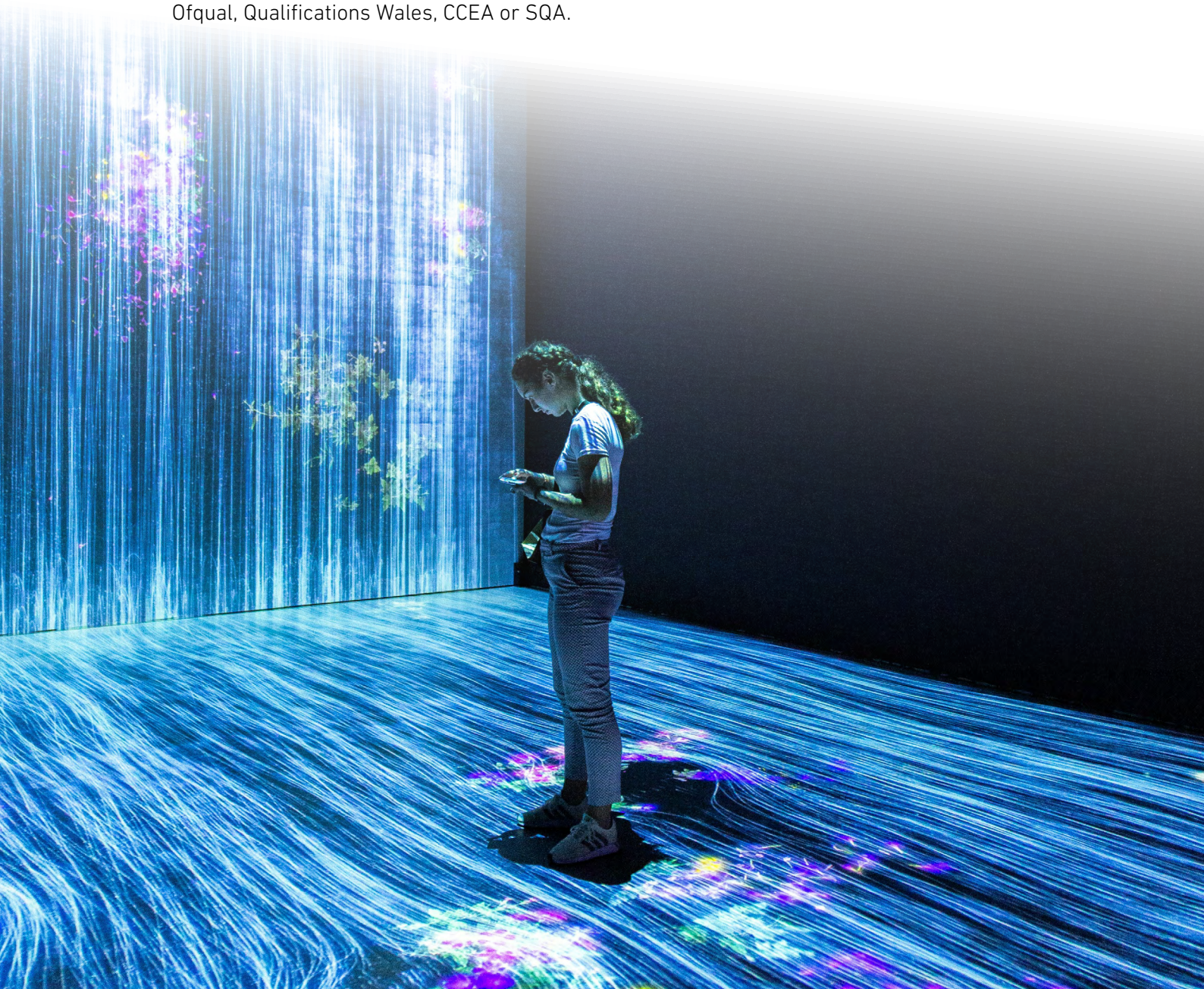


GENERATIVE ARTIFICIAL INTELLIGENCE

BCS FOUNDATION AWARD

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



CONTENTS

INTRODUCTION	.....	05
LEARNING OUTCOMES	.....	05
QUALIFICATION	.....	06
TRAINER CRITERIA	.....	06
SFIA LEVELS	.....	07
SYLLABUS	.....	08
EXAMINATION FORMAT	.....	17
QUESTION WEIGHTING	.....	18
RECOMMENDED READING	.....	19
DOCUMENT CHANGE HISTORY	.....	20



INTRODUCTION AND OVERVIEW

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.

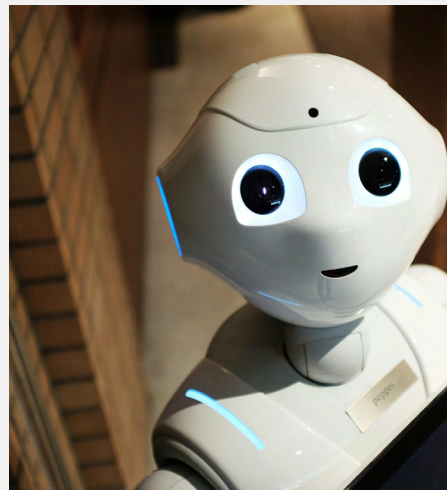
Generative AI represents a major shift in organisations– how they operate, interact with customers, and develop new products and services. As more organisations adopt AI solutions, understanding how generative AI works and how to use it is essential for individuals and organisations.

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 AI.
- 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 represents 3 credits that can count towards the credits required for a BCS Foundation Certificate or Diploma in a relevant discipline.

TOTAL QUALIFICATION TIME	GUIDED LEARNING HOURS	INDEPENDENT LEARNING	ASSESSMENT TIME
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

SFIAPLUS

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

Adheres to information handling procedures and follows relevant standards, policies and legislation in handling data.

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.

BINT2WA0937

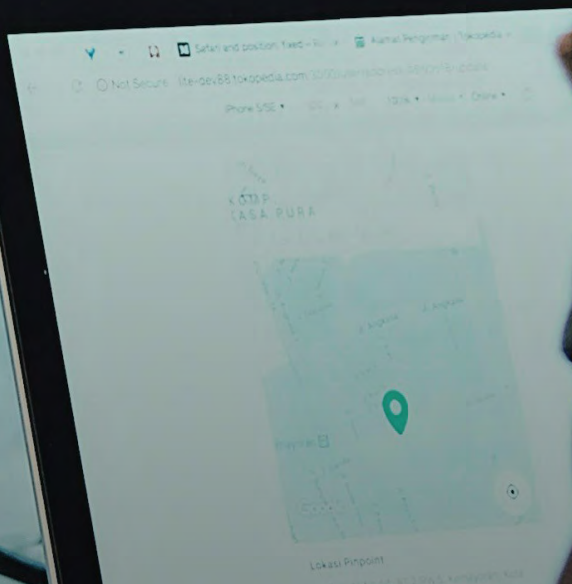
Assists in the application of appropriate safeguards to the handling of data and any analysis results.

Click [HERE](#) further information regarding the SFIA Levels.



SYLLABUS

```
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
```



SYLLABUS

1. WHAT IS GENERATIVE AI? 25% K2

1.1 Describe key generative AI terms.

Indicative content

- a. Artificial intelligence (AI) - Intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals.
- b. Generative artificial intelligence (Gen AI) - Deep-learning models that can generate high-quality text, images and other content based on the data they were trained on.
- c. 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 AI.

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.



SYLLABUS

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. Pre-training 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.

2.3 Describe the role of transformers.

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)

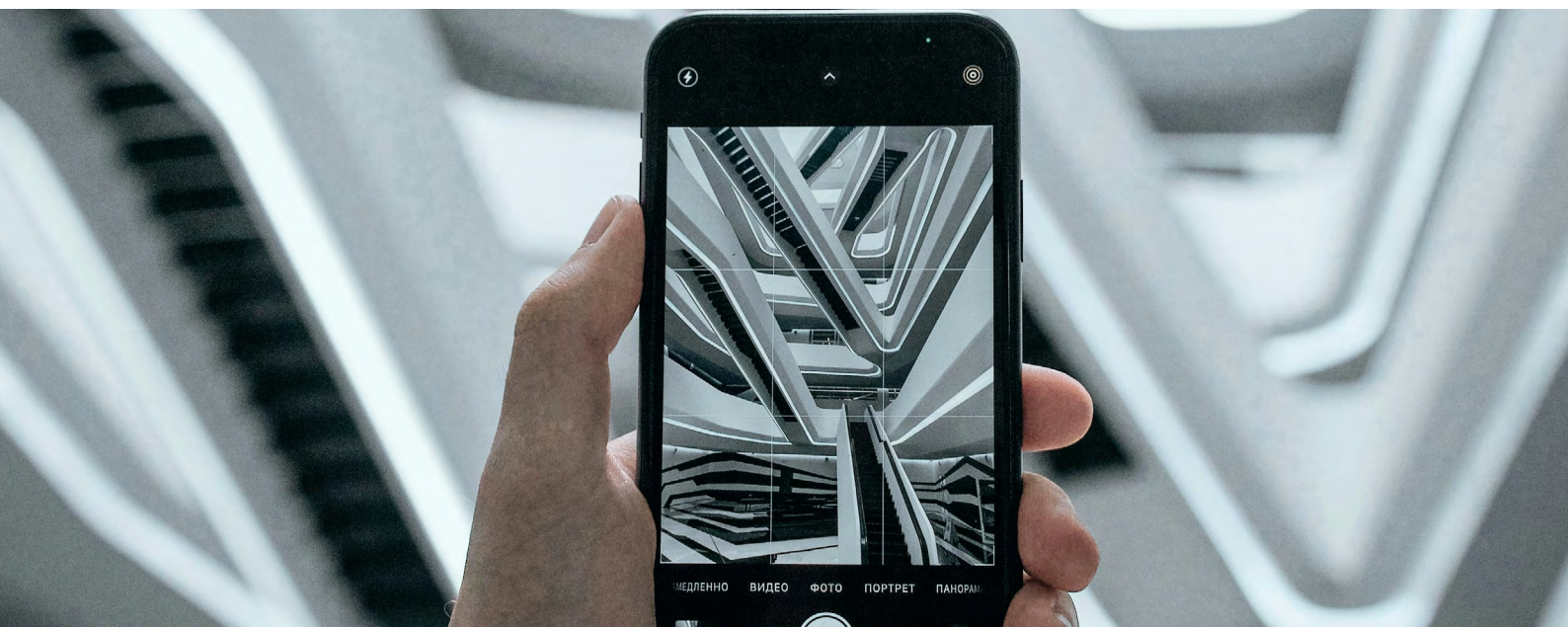
Guidance

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.



SYLLABUS

3. PROMPTING GENERATIVE AI 10% K2

3.1 Explain the role of prompts.

Indicative content

- a. To request an output.
- b. Prompt engineering.

Guidance

A prompt is the instruction given to the generative AI 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.

SYLLABUS

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.

SYLLABUS

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 [BCS reasonable adjustments policy](#) 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)

PASSMARK

(65%)
13/20

DELIVERY

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

Question Type

1	What is generative AI?	25%		All questions are single mark, multiple choice.
2	How generative AI works.	25%		
3	Prompting generative AI.	10%		
4	Validating and checking the output.	15%		
5	Ethical and legal concerns.	25%		



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

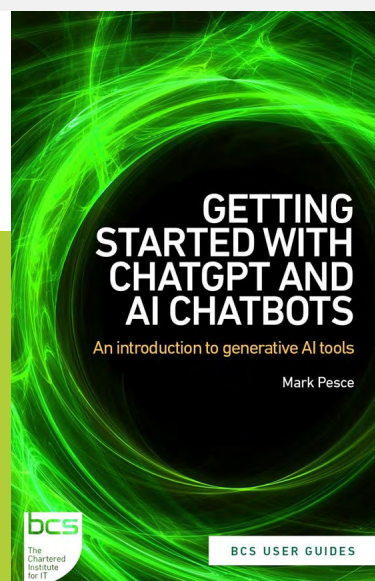
AUTHOR: Andrew Lowe and Steve Lawless

PUBLISHER: BCS

PUBLICATION DATE: *February 2021*

ISBN: *9781780175287*

Note - second edition due for publication October 2024.



USING BCS BOOKS

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
V1.0 August 2024	Document created.

For further information please contact:

BCS

The Chartered Institute for IT

3 Newbridge Square

Swindon

SN1 1BY

T +44 (0)1793 417 417

www.bcs.org

© 2024 Reserved. BCS, The Chartered Institute for IT
All rights reserved. No part of this material protected
by this copyright may be reproduced or utilised in
any form, or by any means, electronic or mechanical,
including photocopying, recording, or by any
information storage and retrieval system without
prior authorisation and credit to BCS, The Chartered
Institute for IT.

Although BCS, The Chartered Institute for IT has used
reasonable endeavours in compiling the document
it does not guarantee nor shall it be responsible for
reliance upon the contents of the document and shall
not be liable for any false, inaccurate or incomplete
information. Any reliance placed upon the contents
by the reader is at the reader's sole risk and BCS, The
Chartered Institute for IT shall not be liable for any
consequences of such reliance.

