Next Generation Higher National Unit Specification

Artificial Intelligence (SCQF level 7)

Unit code: J693 47

SCQF level: 7 (8 SCQF credit points)

Valid from: session 2023–24

Prototype unit specification for use in pilot delivery only (version 2.0) August 2023

This unit specification provides detailed information about the unit to ensure consistent and transparent assessment year on year.

This unit specification is for teachers and lecturers and contains all the mandatory information required to deliver and assess the unit.

Unit purpose

This introductory unit provides learners with an understanding of the fundamental principles and advancements in artificial intelligence (AI). Designed to reflect the current state of AI, this unit equips learners with essential knowledge and skills to navigate the rapidly evolving landscape of AI, including the emerging area of generative AI.

It is a non-specialist unit, intended for a wide range of learners, and is particularly appropriate for learners with an interest in science, technology, engineering or mathematics (STEM).

The unit covers the historical development of AI, contemporary applications of AI, current trends in AI, and the implications of AI for individuals, organisations and society — including the impact of AI on employment. It explores both general AI and narrow AI systems.

Learners explore the historical development of AI, machine learning and deep learning, while focusing on recent advancements, including generative AI. Learners explore contemporary applications of AI systems across various industries, showcasing the transformative potential of AI in solving complex problems and improving efficiency. They examine how chatbots have changed communication by enabling interactive and conversational interfaces, while generative AI has opened new possibilities in creative content generation, from art to storytelling.

Learners gain insights into the different types of problems AI can address, including natural language processing, image recognition, data analysis, and decision-making. They are introduced to the AI tools, techniques and problem-solving approaches that have emerged in recent years.

This unit emphasises the impact of AI on individuals, organisations, and society, focusing on current trends and implications. Learners examine the ethical considerations surrounding AI, such as fairness, transparency, privacy, and the potential biases within AI systems. They also explore the broader societal impact of AI, including its influence on employment, automation and socioeconomic disparities.

The unit incorporates practical applications of AI in the learners' vocational field of interest, highlighting how AI is used to enhance productivity, streamline processes, and drive innovation across diverse industries. Learners develop basic user skills in AI technologies and gain hands-on experience in applying AI tools and techniques to solve problems within specific vocational contexts.

By the end of the unit, learners have a understanding of contemporary AI, equipped with the knowledge and skills to critically analyse AI systems, contribute to ethical discussions, and explore potential opportunities and challenges presented by AI.

Once they have completed this unit, learners understand:

♦ the historical development of AI and its relationship with other distinct disciplines
♦ how narrow and general AI is currently used
♦ how AI could be used in specific vocational areas

♦ the likely impact of AI on employment and

♦ the ethical dilemmas that AI applications pose

Learners can progress to the Applied Artificial Intelligence unit at SCQF level 8.

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Unit outcomes

Learners who complete this unit can:

1   describe the historical development of artificial intelligence, machine learning and deep learning
2   describe contemporary applications of artificial intelligence
3   apply artificial intelligence in a specific vocational field
4   evaluate the ethical implications of artificial intelligence for society

Evidence requirements

Learners must provide knowledge and product evidence for this unit.

Knowledge evidence

The knowledge evidence comprises descriptions and explanations of the key concepts covered in outcomes 1, 2 and 4. While we do not expect in-depth coverage , evidence should demonstrate broad understanding of fundamental topics without omitting critical knowledge such as major milestones in AI history.

You can sample knowledge and understanding when testing is used. If you use testing, it must sample broadly across shallow knowledge rather than narrowly on deep knowledge. The sample must be unknown and unpredictable to the learner. Given the knowledge domain of this unit, we recommend that you use extended response questions..

When testing is used, learners must produce evidence under controlled conditions in terms of location, supervision and timing. They are not allowed access to reference material if testing is used.

Product evidence

The product evidence should demonstrate the learner's ability to apply AI to solve a real or simulated problem in a vocational field, meeting outcome 3. Evidence should include at least one AI-based solution to a vocational problem using routine AI tools and techniques.

The solution must be documented or recorded in product form, such as a report, application or video. The problem and solution approach should be clearly described. The evidence may be produced under lightly controlled conditions.

The SCQF level of this unit provides additional context on the nature of the required evidence and the associated standards. The following level descriptors are particularly relevant to the evidence:

♦   An overall appreciation of the body of knowledge
♦   Knowledge that is embedded in the main theories, concepts and principles
♦   An awareness of the dynamic nature of knowledge and understanding
♦   Use of some basic and routine professional skills, techniques, practices and materials
♦   Use of a range of approaches to address defined and/or routine problems

♦ The exercising of a degree of initiative and independence in carrying out defined activities

These level descriptors should be used (explicitly or implicitly) when making judgements about the evidence.

When evidence is produced in uncontrolled or lightly controlled conditions it must be authenticated. The [Guide to Assessment](#) provides further advice on methods of authentication.

The 'Additional guidance' section in this unit provides specific examples of assessment.

Knowledge and skills

The following table shows the knowledge and skills covered by the unit outcomes:

Knowledge	Skills
Outcome 1 Learners should understand: ♦ the evolution of natural intelligence ♦ the distinction between AI, machine learning and deep learning ♦ milestones in the evolution of AI, including neural networks robotics and chatbots ♦ the influence of computer science, mathematics, psychology, linguistics, philosophy and neuroscience on the evolution of AI ♦ technological factors in the development of AI ♦ the capabilities and limitations of contemporary narrow and general AI ♦ timescales for potential future developments in general AI	
Outcome 2 Learners should understand: ♦ big data and its role in machine learning including pattern recognition ♦ the types of problem that narrow and general AI can currently solve ♦ AI tools and techniques including neural networks, and generative AI ♦ problem-solving approaches used in AI systems ♦ applications of narrow AI ♦ applications of general AI	

Knowledge	Skills
	Outcome 3 Learners can: ♦ select AI tools ♦ apply AI tools and techniques in a vocational field ♦ deploy user skills in the use of AI technologies such as interacting with generative AI
Outcome 4 Learners should understand: ♦ the benefits of AI to individuals, organisations and society ♦ the impact of AI on society, including technological unemployment and inequality ♦ the potential for machine bias ♦ the threat to personal privacy ♦ robot rights and machine ethics ♦ the unintended consequences of advanced AI and/or superintelligence ♦ mitigations against unintended consequences of general AI including regulation	

Meta-skills

Throughout the unit, learners develop meta-skills to enhance their employability in the computing sector.

Self-management

This meta-skill includes:

♦ focusing, integrity, adapting and initiative

Learners research AI innovations independently to build skills of adaptability and self-management. They assess their own ability to learn and apply new AI tools. Learners perform technical tasks like configuring AI systems to develop their focus on details.

Social intelligence

This meta-skill includes:

♦ communicating and collaborating

Learners' presentation of an AI solution for a vocational problem will develop their technical communication abilities. Group discussions on the implications of AI promotes relationship building with peers.

Innovation

This meta-skill includes:

♦ sense-making and critical thinking

The open-ended vocational problem scenario will require creative thinking to conceptualise an AI solution. Evaluating ethical implications involves recognising potential issues and risks with AI applications, while assessing AI's benefits and risks requires sound reasoning and judgement.

Delivery of unit

If you deliver this unit as part of a group aware, we recommend teaching and assessing it within the subject area of the group award to which it contributes.

We recommend that you teach the knowledge outcomes in sequence 1, 2 and 4. You can teach the practical outcome 3 at any time during the life of the unit. To enliven the learning experience, we recommend that you do this immediately after the basic theory is covered, early in the unit.

While the exact time allocated to this unit is at your centre's discretion, the notional design length is 40 hours. However, you may wish to distribute the available time as follows:

Outcome 1 — Describe the historical development of artificial intelligence, machine learning and deep learning
(10 hours)

Outcome 2 — Describe contemporary applications of artificial intelligence systems
(8 hours)

Outcome 3 — Apply artificial intelligence in a specific vocational field
(12 hours)

Outcome 4 — Evaluate the ethical implications of artificial intelligence for society
(10 hours)

Delivery of meta-skills

The outcomes focus on applying AI tools in a vocational context, which requires adaptability, self-directed learning, and problem solving. Collaborating with peers and communicating technical concepts also emerge as key skills. Imagination and creativity are needed to conceptualise AI solutions. Critical analysis of ethical implications builds computational and logical thinking.

Here are suggestions on how you could enable development of these meta-skills:

♦ Group projects and discussions to improve collaboration and communication
♦ Open-ended problem scenarios that allow creative AI solutions
♦ Independent research tasks into AI innovations
♦ Assessments focused on analysis, evaluation, and articulating perspectives
♦ Tying learning activities and feedback to growth in adaptability, computational thinking, creativity, and other meta-skills

Highlighting connections between the AI content and development of creativity, collaboration, logical reasoning, and other transferable skills helps to prepare learners for future studies and work.

Additional guidance

The guidance in this section is not mandatory.

Content and context for this unit

The general context for this unit is the rising public interest in this emerging aspect of computer science and its relevance in an increasing number of occupations and professions. The unit is intended for non-specialists and may be offered as part of a wide range of programmes. No prior knowledge of computer science or AI is required.

You can explain the topics through the use of video, film and audio, and the field of AI is rich in all three. We recommend taking a learner-centred approach to teaching. Learners can independently research most of the topics. If you use this approach, you must provide context, set objectives and regularly review progress. We would also suggest that you encourage group discussions and/or debates, particularly in relation to the implications of AI for society.

This unit is intended to be a broad and general introduction to the field of AI. As such, the treatment of any topic should be light. For example, you need only cover a limited number of significant milestones in the evolution of AI. The application of AI (outcome 3), in particular, should be straightforward (such as the use of chatbots, or other generative AI tools, in a vocational context).

You should present the applications and implications of AI in a balanced way throughout the unit, neither overstating the opportunities nor understating the threats posed by this technology.

AI can be categorised in several different ways. In this unit, we talk about 'narrow' AI (such as AI within video games or recommendation systems) and 'general' AI (such as generative AI). You should emphasise that 'true' general AI is not yet possible.

Please note that in the following guidance, relating to specific outcomes, we do not seek to explain each knowledge and skills statement, which we leave to educators. Rather, we look to clarify the statement of standards where it is potentially ambiguous. We also focus on non-apparent teaching and learning issues that can be overlooked, or not emphasised, during unit delivery. As such, it is not representative of the relative importance of each knowledge and skill.

Describe the historical development of artificial intelligence, machine learning and deep learning (outcome 1)

This outcome relates to the historical development of AI, machine learning and deep learning. It seeks to put contemporary AI into an historical context so that learners can appreciate how current systems came about.

The knowledge statements cover key introductory AI concepts. Given the broad scope of the outcome, treat each topic at a high level. For example, when covering the evolution of natural intelligence, provide a simple explanation of how biological intelligence evolved, and basic theories of how the mind works. There is an opportunity to discuss the 'hard problem' of

consciousness. Take a similar high-level approach when explaining major milestones in AI history, focusing on just a few breakthroughs. Emphasise that AI progress has not been linear, with periods of stagnation known as 'AI winters'.

Cover the vital role of algorithms and training data in AI, including how algorithm quality impacts AI capabilities and potential biases and/or inaccuracies introduced through code and date. Explain contemporary AI's functional limits simply, but cover the technological factors behind them at a level accessible to non-experts.

One key goal is making learners aware of AI's ubiquity, for example facial recognition, natural language processing like chatbots and voice assistants. Introduce chatbots as an example of narrow AI applied for conversational interfaces. Discuss the capabilities and limitations of chatbots for realistic applications.

There is ongoing debate around timelines for achieving artificial general intelligence (AGI). Emphasise the current ambiguity regarding when milestones like AGI, self-driving vehicles, and fully autonomous robots may be achieved. If covering generative AI, provide a simple explanation of how it can synthesise realistic content like images and text, along with ethical concerns.

Describe contemporary applications of artificial intelligence systems (outcome 2)

This outcome focuses on current AI applications, categorised as 'narrow' or 'general' AI. Take care when explaining problem-solving approaches, providing high-level overviews of statistical, computational, and symbolic techniques with relevant examples.

Many learners may not realise the link between AI and big data, and how large datasets have improved AI capabilities like pattern recognition. Provide concrete examples of this, such as image recognition systems trained on millions of samples. At the time of writing, there is controversy around intellectual property rights relating to the datasets used to train large language models.

Explain the increasing use of hybrid systems combining human and AI capabilities that appear to be fully automated, and the reasons for this approach.

As later outcomes focus on AI drawbacks, take the opportunity here to highlight benefits. For example, discuss how chatbots increase accessibility to information and services through natural conversation. Or how generative AI can synthesise realistic content like images to boost human creativity. But balance potential benefits with ethical considerations around deep fakes and misinformation.

Focus on high-level overviews of current AI applications and problem-solving approaches. Use relevant examples like chatbots and generative AI, highlighting benefits but noting ethical concerns to prepare for later discussion.

Apply artificial intelligence in a specific vocational field (outcome 3)

This outcome requires learners to apply AI to solve problems relevant to their vocational field. It builds on prior discussion of current AI applications across various sectors.

Potential vocational contexts include:

♦ office administration
♦ manufacturing
♦ computing
♦ engineering
♦ law
♦ marketing
♦ social care
♦ health care

The goal is to increase awareness of how AI is used in learners' chosen vocations. Explore the potential for AI to take on skilled jobs and tasks.

Learners must make practical use of AI to solve a straightforward, vocationally relevant problem. For example, in an office setting they could:

♦ use a chatbot to interact with a customer in a foreign language
♦ employ AI features in office software to improve productivity
♦ investigate how AI can enhance customer relationship management or medical diagnosis

While the AI application should be simple, ensure learners appreciate problems that AI can and cannot currently solve. You may highlight limitations of chatbots for complex conversations or risks of generative AI for creating fake content.

In this outcome, learners gain hands-on experience with AI in their vocational field while recognising its current strengths and limitations. Discussion of chatbots and generative AI provides relevant examples of emerging technologies with transformative potential if applied responsibly.

Evaluate the ethical implications of artificial intelligence for society (outcome 4)

This outcome examines AI's ethical implications. Present it in a balanced perspective without overstating or understating potential threats. Focus primarily on more immediate and, mundane concerns like technological unemployment rather than futuristic scenarios like, superintelligence.

Many learners may not realise how AI threatens personal privacy, such as digital assistants in homes. Discuss potential regulations to mitigate privacy risks.

Reiterate how algorithms shape AI capabilities and biases. Provide examples like chatbots picking up harmful speech patterns when trained on unfiltered data or generative AI mimicking societal biases if its training data lacks diversity.

Some applications raise specific ethical dilemmas. The use of AI in predictive policing to forecast 'future crime' is controversial, as is leveraging human emotional attachment to robots for companionship or sex. These highlight issues around machine ethics and robot rights.

Learners should develop a nuanced perspective on AI's benefits and risks. Highlight near term concerns like privacy, bias, and unemployment over speculative long-term threats. Ethical debates surrounding chatbots, generative AI and other emerging applications provide relevant discussion points. The goal is an informed, mature evaluation of AI's impact on society.

Approaches to assessment

If you deliver this unit as part of group award, we recommend teaching and assessing it within the subject area of the group award to which it contributes.

Acceptable performance in this unit is the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Where evidence for outcomes is assessed on a sample basis, the whole of the content listed in the 'Knowledge and skills' section must be taught and available for assessment. You should not give learners advance information about the items they are being assessed on, and you should sample different items on each assessment occasion.

Evidence can be generated through various assessment methods. The following are suggestions only.

For knowledge, traditional testing could involve the use of extended response questions for outcomes 1, 2 and 4, with a pass mark of 50%. Suitable questions could include the following:

♦ Describe three milestones in the development of contemporary AI systems.
♦ Explain two ethical concerns relating to contemporary AI systems.
♦ Describe two technological developments that facilitated the recent improvement in artificial intelligence.
♦ Describe the difference between narrow and general AI. Give one example of each.
♦ What is generative AI? Give two applications of generative AI.
♦ Describe two applications of AI in a vocational field of your involve a multiple-choice.
♦ How might regulation reduce the potential harms of AI?
♦ Give two benefits and two threats that AI poses to society.

For product evidence, learners could apply AI to a vocational problem, documenting the solution in a report, video, or other format. For example, describing use of chatbot technology to enable cross-language conversations.

A more contemporary approach to assessment would use learner blogs, covering activities and learning throughout the unit, including videos demonstrating product skills. Blogs should be scored against defined criteria, covering all required knowledge and skills.

For formative assessment, an item bank of selected-response questions could check knowledge at outcome milestones, providing feedback on learner progress. Blogs also reveal learner progress and misconceptions for early intervention.

Chatbots and generative AI provide engaging applications to demonstrate in product evidence. Discuss positives but also ethical implications. Ensure assessment methods work for online and in-person contexts. Emphasise capabilities over limitations to build AI confidence.

Equality and inclusion

This unit is designed to be as fair and as accessible as possible with no unnecessary barriers to learning or assessment.

You should take into account the needs of individual learners when planning learning experiences, selecting assessment methods or considering alternative evidence.

Guidance on assessment arrangements for disabled learners and/or those with additional support needs is available on the assessment arrangements web page: www.sqa.org.uk/assessmentarrangements.

Information for learners

Artificial Intelligence (SCQF level 7)

This information explains:

♦ what the unit is about

♦ what you should know or be able to do before you start

♦ what you need to do during the unit

♦ opportunities for further learning and employment

Unit information

This introductory unit provides AI basics without needing prior computer science knowledge. You learn about AI's history, development, theory, and real-world applications.

Topics that you cover include:

♦ the evolution of AI, including important milestones like robotics and neural networks

♦ how technology has advanced (and hindered) AI progress

♦ capabilities and limitations of current AI systems

♦ benefits of AI, such as automating routine tasks, finding patterns in data, and interacting conversationally through chatbots

♦ how AI is used in various vocations and how you can apply it in your field

♦ hands-on experience with AI tools and techniques like language translation, speech recognition, and digital assistants

♦ ethical implications of AI related to bias, privacy, and unemployment

♦ AI's potential impacts on society and employment

You focus on high-level overviews rather than technical depth. You may encounter multimedia presentations, such as audio and video to provide engaging learning experiences.

You also implement basic AI solutions for real or simulated vocational problems. This will build your first-hand understanding of AI systems and how to use them responsibly.

You may be assessed through methods such as tests, blogs, projects, and discussions. Assessment will involve testing your cognitive grasp of the concepts and principles of AI and practical work in the use of AI systems such as chatbots or generative AI.

By the end of the unit, you will have a solid grasp of AI's past, present, and future potential. You will gain skills to apply AI in your work, while considering its benefits and risks. Overall, the unit provides a springboard to further AI study or use in your career.

Administrative information

Published: August 2023 (version 2.0)

Superclass: CB

History of changes

Version	Description of change	Date
2.0	We have adjusted knowledge and skills to incorporate advances in generative AI and neural networks. We have expanded additional guidance.	August 2023

Note: please check [SQA's website](#) to ensure you are using the most up-to-date version of this document.

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