



National Unit Specification

General information

Unit title: Artificial Intelligence (SCQF level 6)

Unit code: J8E0 46

Superclass: CB

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Unit purpose

The purpose of this non-specialist unit is to develop learners' knowledge and experience of Artificial Intelligence (AI). The unit is appropriate for a wide range of learners, particularly those with an interest in STEM.

During the unit, learners will: understand the history of AI, explore current and emerging applications of AI, appreciate the relationship between AI and Machine Learning and different types of ML, consider the ethical issues, and discuss the risks and opportunities posed by AI. Learners will also gain practical skills in training data models using Machine Learning.

On completion of this unit, learners will have gained confidence in their use of AI. They will understand the key principles of Artificial Intelligence, the reasons behind the growth of AI, current and emerging applications, ethical issues (including risks and opportunities) while also building the skills to evaluate and select models.

Learners may progress to other units at this level, or further develop their knowledge and skills in this area by undertaking more advanced qualifications at SCQF level 7.

National Unit Specification: General information (continued)

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Outcomes

On successful completion of the unit the learner will be able to:

1. Explain the development of Artificial Intelligence and reasons for its growth.
2. Explain current and emerging applications of Artificial Intelligence.
3. Explain ethical issues relating to the use of Artificial Intelligence, and the risks and opportunities posed by the technology.
4. Train, test and compare models.

Credit points and level

1 National Unit credit at Scottish Credit and Qualifications Framework (SCQF) level 6: (6 SCQF credit points at SCQF level 6).

Recommended entry to the unit

Entry is at the discretion of the centre. However, prior knowledge of computer science or AI is desirable.

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the support notes for this unit specification. There is no automatic certification of Core Skills or Core Skill components in this unit.

Context for delivery

If this unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

For example, if this unit is delivered as part of the National Progression Award in Computing Technologies at SCQF level 6, it will follow the mandatory unit J8DW 46 Computing Foundations (SCQF level 6) and may contribute towards J8DY 46 Computing: Project (SCQF level 6).

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. Further advice can be found on our website: [SQA Assessment Arrangements](http://www.sqa.org.uk/assessmentarrangements) (www.sqa.org.uk/assessmentarrangements).

National Unit Specification: Statement of standards

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Acceptable performance in this unit will be 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.

Outcome 1

Explain the development of Artificial Intelligence and reasons for its growth.

Performance criteria

- (a) Explain how technological developments have enabled the growth of AI.
- (b) Explain how Big Data has impacted the growth of AI.
- (c) Explain how the demand for automation has impacted the growth of AI.
- (d) Explain how AI has been integrated with other technologies.

Outcome 2

Explain current and emerging applications of Artificial Intelligence.

Performance criteria

- (a) Explain how AI is used to address contemporary problems.
- (b) Describe emerging applications of AI.
- (c) Explain the relationship between AI, data science and Machine Learning.
- (d) Explain the difference between supervised, unsupervised and reinforcement learning.
- (e) Describe the applications of large language models.
- (f) Describe the applications of neural networks.

Outcome 3

Explain ethical issues relating to the use of Artificial Intelligence, and the risks and opportunities posed by the technology.

Performance criteria

- (a) Explain the impact of AI on employment.
- (b) Explain ethical issues relating to the use of AI.
- (c) Explain how AI can present a bias through its training data.
- (d) Explain the risks and opportunities posed by the AI alignment problem.
- (e) Explain the risks and opportunities posed by a potential AI intelligence explosion.

National Unit Specification: Statement of standards (continued)

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Outcome 4

Train, test and compare models.

Performance criteria

- (a) Select models to solve a problem.
- (b) Prepare training data for AI models.
- (c) Train the models to solve a defined problem.
- (d) Develop and execute test plans for the models.
- (e) Compare and evaluate the models.

Evidence requirements for this unit

Evidence is required to demonstrate that learners have achieved all outcomes and performance criteria. The evidence requirements for this unit will take two forms.

1. Knowledge evidence.
2. Product evidence.

The knowledge evidence will relate to outcome 1, outcome 2 and outcome 3. The knowledge evidence may be written or oral or a combination of these. All performance criteria must be evidenced. Minimal evidence may be used to infer competence. The statements and descriptions for the development, applications and ethical issues of AI must demonstrate a clear understanding and examples should be provided where appropriate.

The knowledge evidence may be sampled when testing is used. Testing must be carried out under supervised conditions and must be controlled in terms of location and time. Access to reference material is not permitted. The sampling frame, on all occasions, must include outcome 1, outcome 2 and outcome 3 (but not every performance criterion within each outcome). Given the explanatory nature of the outcomes, testing will require extended response questions.

The product evidence will relate to outcome 4. It will take the form of an AI model that has been through the stages of the AI model life cycle.

National Unit Specification: Statement of standards (continued)

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The product evidence for outcome 4 should demonstrate that learners can:

- Define a real-world problem that could be solved with AI.
- Create or source an appropriate data set.
- Prepare and clean a data set.
- Use existing systems or construct close approximations to train their own AI models.
- Train two AI models for the same problem. The models can either be trained with one system using two data sets or two different systems using the same data set.
- Create test plans for both models.
- Test and evaluate both model's performance in addressing the original problem to gauge effectiveness and identify areas for enhancement.
- Evaluate and compare the two models with respect to accuracy, precision, and recall.

The problem should be unfamiliar and sufficiently complex to reflect the level of the unit.

When evidence is produced in loosely controlled conditions it must be authenticated. The guide to assessment provides further advice on methods of authentication.

The SCQF level of this unit (level 6) provides additional context on the nature of the required evidence and the associated standards. Appropriate level descriptors should be used when making judgements about the evidence.

The Support Notes section of this specification provides specific examples of instruments of assessment that will generate the required evidence.



National Unit Support Notes

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Unit support notes are offered as guidance and are not mandatory.

While the exact time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit

This unit is intended for learners who wish to develop their existing knowledge and skills in AI. However, it is recommended prior knowledge of Computing Science and AI is desirable.

Learners will require access to appropriate software to undertake this unit. Coding a model is not required and there is a range of software that could be used to provide the required functionality including:

- [Teachable Machine](https://teachablemachine.withgoogle.com) (<https://teachablemachine.withgoogle.com>)
- [Machine Learning for Kids](https://machinelearningforkids.co.uk) (<https://machinelearningforkids.co.uk>)
- [Lobe](http://www.lobe.ai) (www.lobe.ai)
- [Obviously AI](http://www.obviously.ai) (www.obviously.ai)
- [Runway](http://www.runwayml.com/ai-tools/ai-training/) (www.runwayml.com/ai-tools/ai-training/)

The data sets used should be large, varied and include familiar and unfamiliar contexts. Familiar data would be appropriate to use in the early stages of the unit, but unfamiliar data should be used when training and testing models.

Learners can use pre-existing data sets or create their own. Data sets are available online from various sources, including:

- [Kaggle](http://www.kaggle.com) (www.kaggle.com)
- [UC Irvine](http://www.archive.ics.uci.edu) (www.archive.ics.uci.edu)
- [Hugging Face](http://www.huggingface.co) (www.huggingface.co)
- [Trello NPA Data Science](http://www.trello.com/b/TGMf9U4S/npa-curricular-resources) (www.trello.com/b/TGMf9U4S/npa-curricular-resources)
- [data.world](http://www.data.world/datasets/open-data) (www.data.world/datasets/open-data)

National Unit Support Notes (continued)

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Guidance on approaches to delivery of this unit

This unit is a mixture of theory and practical. outcome1, outcome2 and outcome 3 relate to theory and outcome 4 relates to practical work.

It is recommended that the outcomes are taught in sequence. Outcome 1 provides an introduction to the field, outcome 2 introduces applications and technical detail, outcome 3 presents the ethical issues surrounding the technology and outcome 4 applies this knowledge to train AI models to solve a problem. However delivering outcome 3 after outcome 4 could provide learners with the practical experience to inform their discussion around the ethical considerations.

There are many sources of engaging content on AI to help achieve outcome 1, outcome 2 and outcome 3.

- [The AI Education Project \(www.aiedu.org\)](http://www.aiedu.org)
- [The Alan Turing Institute \(www.turing.ac.uk/courses\)](http://www.turing.ac.uk/courses)
- [Raspberry Pi Foundation \(www.experience-ai.org\)](http://www.experience-ai.org)
- [Machine Learning for Kids \(https://machinelearningforkids.co.uk\)](https://machinelearningforkids.co.uk)
- [AI 4 All \(www.ai-4-all.org/resources\)](http://www.ai-4-all.org/resources)
- [NCCE \(www.teachcomputing.org/artificial-intelligence\)](http://www.teachcomputing.org/artificial-intelligence)
- [Scottish AI Alliance \(www.scottishai.com/resources\)](http://www.scottishai.com/resources)

The theory content for outcome 1, outcome 2 and outcome 3 could be reinforced with practical experience with existing AI tools such as:

- [ChatGPT \(www.openai.com/chatgpt\)](http://www.openai.com/chatgpt)
- [Gemini \(https://gemini.google.com/app\)](https://gemini.google.com/app)
- [Copilot \(https://copilot.microsoft.com\)](https://copilot.microsoft.com)
- [Akinator \(www.akinator.com\)](http://www.akinator.com)
- [AI Dungeon \(www.aidungeon.com\)](http://www.aidungeon.com)
- [This Person Does Not Exist \(www.thispersondoesnotexist.com\)](http://www.thispersondoesnotexist.com)
- [Magic Sketchpad \(www.magic-sketchpad.glitch.me\)](http://www.magic-sketchpad.glitch.me)
- [Magenta \(https://magenta.tensorflow.org/demos\)](https://magenta.tensorflow.org/demos)
- [Quick Draw \(https://quickdraw.withgoogle.com\)](https://quickdraw.withgoogle.com)
- [Hugging Face \(www.huggingface.co/spaces\)](http://www.huggingface.co/spaces)
- [Suno \(www.suno.com\)](http://www.suno.com)

National Unit Support Notes (continued)

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It is recommended that a problem solving approach is taken to teaching and learning for outcome 4. Learners should develop their skills and knowledge by solving various problems across unfamiliar contexts. For example learners could:

- Train an image recognition model to differentiate between three objects, for example:
 - Vehicles
 - Tools
 - Flowers
- Train an audio recognition model to differentiate between three sounds, for example:
 - Languages
 - Keywords
 - Wildlife
- Train a predictive model to predict missing data in a CSV file, for example:
 - Sales forecasting based on historical sales data
 - Insurance risk based on past claims
 - Stock price based on historical data

A suggested distribution of time, across the outcomes, is:

Outcome 1: 8 hours.

Outcome 2: 8 hours.

Outcome 3: 8 hours.

Outcome 4: 16 hours.

Guidance on approaches to assessment of this unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

National Unit Support Notes (continued)

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A traditional approach to assessment might involve an extended piece of writing for knowledge evidence and a practical exercise for performance evidence. The writing would relate to the descriptions and explanations defined in the performance criteria. The extended piece of writing could be produced as an essay or report. The completed essay or report would have to satisfy all the performance criteria. The practical exercise would lead learners through the steps required to train, test and evaluate AI models to solve a problem. Learners would create their own test plans and source their own data set. A written report would be produced for the evaluation and comparison between the models.

A contemporary approach to assessment might involve the creation of a blog or portfolio. The blog or portfolio would be produced over the life of the unit. The completed blog or portfolio would have to satisfy all performance criteria. The practical evidence could include written reports or captured video of learner produced AI models with:

- A description of the model purpose.
- An explanation of how the models were trained.
- A demonstration of the functioning models.
- Testing results.
- An evaluation of the models against the original problem.
- A comparison of the models with a decision on which one performs better.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at [SQA e-Assessment](http://www.sqa.org.uk/Guide%20to%20best%20practice.pdf). (www.sqa.org.uk/Guide to best practice.pdf).

National Unit Support Notes (continued)

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Opportunities for developing Core and other essential skills

This unit provides opportunities to develop Core Skills, particularly Information and Communication Technology (ICT), Problem Solving and Communication.

Communication skills will be used throughout the unit. In particular outcome 1, outcome 2 and outcome 3 where learners have to demonstrate their understanding of core AI concepts.

Information and Communication Technology (ICT) and Problem Solving skills will be used throughout the unit, particularly outcome 4 when learners work with data sets and create AI models.

History of changes to unit

Version	Description of change	Date

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Unit template: February 2024

General information for learners

Unit title: Artificial Intelligence (SCQF level 6)

This section will help you decide whether this is the unit for you by explaining what the unit is about, what you should know or be able to do before you start, what you will need to do during the unit and opportunities for further learning and employment.

This unit will cover key principles of Artificial Intelligence. It will explore the reasons behind the growth of AI, current and emerging applications, ethical issues (including risks and opportunities) while also building the skills to create a modern AI model.

In outcome 1 you will cover technological advancements, big data utilization, increasing demand for automation, and how integration with other technologies have collectively driven the growth of AI.

In outcome 2, you'll examine AI's role in contemporary society, delving into its contemporary and emerging applications. Additionally, you'll learn the foundations of data science, machine learning, learning paradigms, large language models and neural networks.

In outcome 3 you will reflect on the ethical considerations surrounding AI. This entails examining bias, impact on jobs, alignment problem and the potential AI intelligence explosion.

In outcome 4, you'll acquire the skills to develop your own AI systems. You will evaluate and compare models to determine which one produces the best results.

The assessment for this unit might include an essay or report showing your knowledge and a demonstration of your practical skills.

When you complete this unit, you could progress to more advanced studies in Artificial Intelligence or data science.