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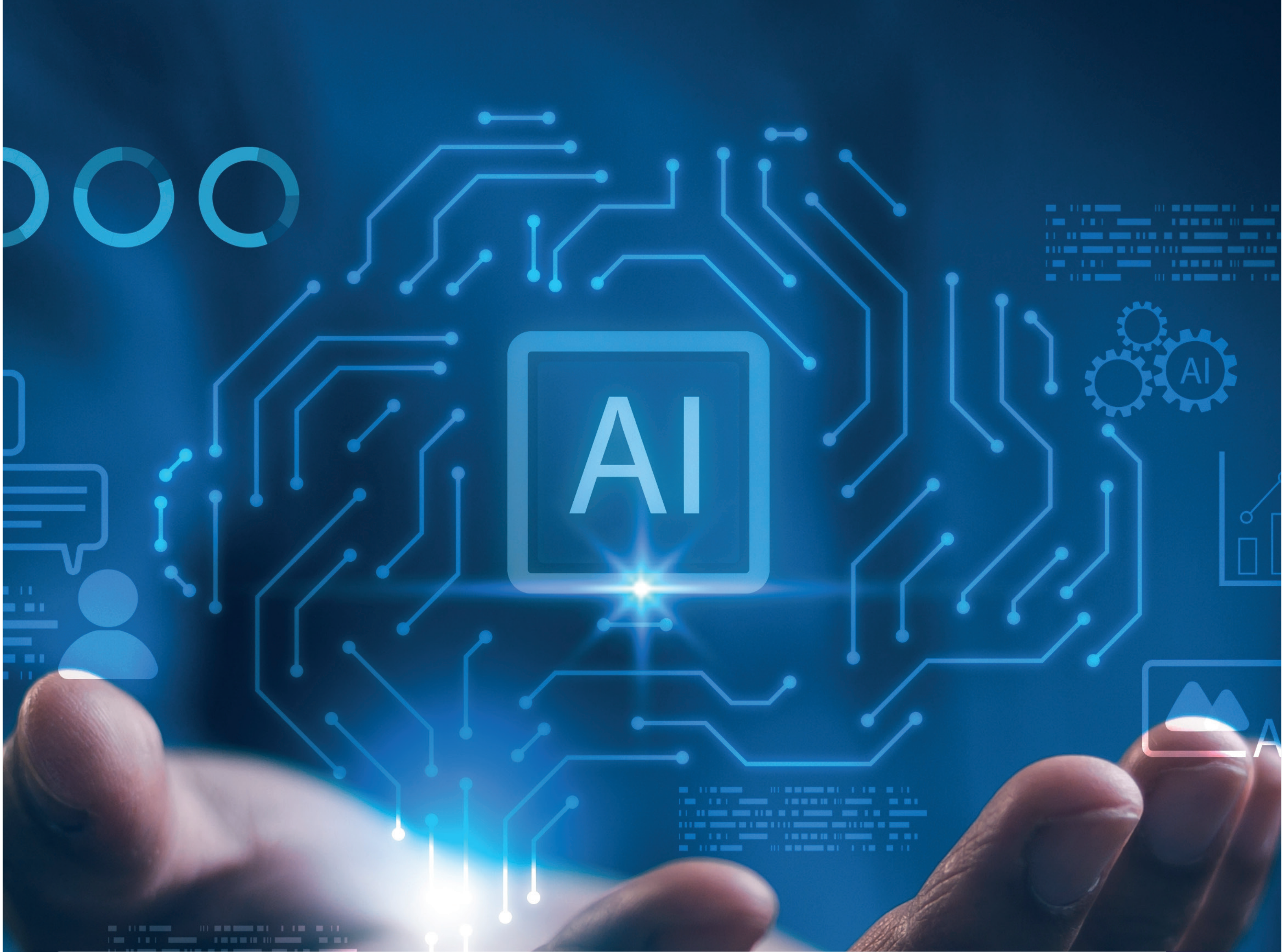


Pearson BTEC
International Level 3 in

# Artificial Intelligence

L3

## Specification

*First teaching from September 2026*

Issue 1

Pearson

# Pearson BTEC International Level 3 Qualifications in Artificial Intelligence

## Specification

First teaching September 2026

First certification from 2028

Issue 1

**About Pearson**

We are the world's leading learning company operating in countries all around the world. We provide content, assessment and digital services to students, educational institutions, employers, governments and other partners globally. We are committed to helping equip students with the skills they need to enhance their employability prospects and to succeed in the changing world of work. We believe that wherever learning flourishes so do people.



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# Welcome

With a track record built over 40 years of student success, our BTEC International Level 3 qualifications are recognised internationally by governments, industry and higher education. BTEC International Level 3 qualifications allow students to progress to the workplace – either directly or via study at a higher level. Over 100,000 BTEC students apply to university every year. Their Level 3 BTECs, either on their own or in combination with A Levels, are accepted by UK and international universities, and higher-education institutes for entry to relevant degree programmes.

## Why are BTECs so successful?

BTECs embody a fundamentally student-centred approach to the curriculum, with a flexible, unit-based structure and knowledge applied through assignments. They enable the holistic development of the practical, interpersonal and thinking skills required to succeed in higher education and employment.

When creating these BTEC Internationals we focused on the skills and personal attributes needed to navigate the future, and have worked with many higher education providers, professional bodies, colleges and schools to ensure that their needs are met. Employers are looking for future employees with a thorough grounding in the latest industry requirements and work-ready skills such as critical thinking and problem solving. Higher education needs students who have experience of research, extended writing and meeting deadlines.

We have addressed these requirements by:

- Facilitating and guiding the development of transferable skills through the design and delivery of the qualifications, using a holistic and practical framework which is based on recent research into the most critical skills needed to navigate the future. This Transferable Skills framework has been used to embed transferable skills in the qualifications where they naturally occur and also to signpost opportunities for delivery and development as a part of the wider BTEC learning experience.
- Supporting the delivery of Sustainability Education and Digital Skills development naturally through the content design of the qualifications. Mapping is provided for each qualification to identify where the opportunities for teaching and learning exist.
- Updating sector-specific content to ensure it is relevant and future-facing.
- Implementing a consistent approach to assessment to better engage students, make the qualifications more accessible for them and more manageable for centres to deliver.

We are providing a wealth of support, both resources and people, to ensure that students and their teachers have the best possible experience during their course. See *Section 5* for details of the support we offer.

## A word to students

Today's BTEC Internationals will require commitment and hard work, as you would expect of the most respected applied learning qualification in the world. You will have to complete a range of units, be organised, take some assessments that we will set and your teachers will mark, and undertake practical tasks and assignments. But you can feel proud to achieve a BTEC because, whatever your plans in life – whether you decide to study further or go on to work – your BTEC International will be your passport to success in the next stage of your life.

Good luck and we hope you enjoy your course.

# Contents

# 1 Introduction

## Why choose Pearson BTEC International Level 3 Qualifications in Artificial Intelligence?

We've listened to feedback from all parts of the Artificial Intelligence (AI) subject community, including higher education. We've used this opportunity of curriculum change to redesign qualifications so that they reflect the demands of a truly modern and evolving Artificial Intelligence environment – qualifications that enable your students to apply themselves and give them the skills to succeed in their chosen pathway.

The units focus on developing knowledge, understanding and practical skills relevant to the Artificial Intelligence sector as applied to the modern world. Key features include hands-on research tasks, planning work, and reflective practice. Assessments are varied and designed to test both technical proficiency and critical thinking. Evidence of achievement can be through written reports, presentations, peer reviews, and/or live demonstrations. Each unit encourages students to apply concepts to real-world scenarios, fostering deeper understanding. Assessment also emphasises communication, planning and evaluation, aligning with higher education and sector expectations.

## Who has supported us in the development of these qualifications?

The Pearson BTEC International Level 3 qualifications in Artificial Intelligence has been developed with input from:

- Belfast Metropolitan College
- The Institute of Artificial Intelligence
- Multiverse
- University of Birmingham.

We are grateful to all the individuals and organisations who generously shared their time and expertise to help us develop these qualifications.

# Total Qualification Time

Pearson specifies a total number of hours that it is estimated students will require to complete and show achievement for the qualification: this is the Total Qualification Time (TQT). Within TQT, Pearson identifies the number of Guided Learning Hours (GLH) that we estimate a centre delivering the qualification might provide. Guided learning means activities, such as lessons, tutorials, online instruction, supervised study and giving feedback on performance, that directly involve teachers and assessors in teaching, supervising and invigilating students. Guided learning includes the time required for students to complete internal assessment under supervised conditions.

In addition to guided learning, other required learning directed by teachers or assessors will include private study, preparation for assessment, and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

BTEC Internationals have been designed around the number of hours of guided learning expected. Each unit in the qualification has a GLH value of 60. There is then a total GLH value for the qualification.

Each qualification has a TQT value. This may vary within sectors and across the suite depending on the nature of the units in each qualification and the expected time for other required learning.

The following table shows the qualifications in this sector and their GLH and TQT values.

| Qualification title | Size and structure | Summary purpose |
|---|---|---|
| **Pearson BTEC International Level 3 Certificate in Artificial Intelligence** | 180 GLH (30 Credits) (240 TQT)<br>Equivalent in size to 0.5 of an International A Level.<br>Three units of which one is mandatory and assessed by a Pearson Set Assignment. Mandatory content (33%). | The Certificate is for students who want an introduction to the sector through applied learning and for whom an element of Artificial Intelligence would be complementary. The qualification supports progression to higher education as part of a programme of study that includes other appropriate BTEC International Level 3 qualifications or International A Levels. |

| Qualification title | Size and structure | Summary purpose |
|---|---|---|
| **Pearson BTEC International Level 3 Extended Certificate in Artificial Intelligence** | 360 GLH (60 Credits) (480 TQT)<br>Equivalent in size to one International A Level.<br>Six units of which three are mandatory, two are assessed by a Pearson Set Assignment. Mandatory content (50%). | The Extended Certificate is for students who are interested in learning about the Artificial Intelligence industry alongside other fields of study, with a view to progressing to a wide range of higher education courses, not necessarily in Artificial Intelligence-related subjects. The qualification is designed to be taken as part of a programme of study that includes other appropriate BTEC International Level 3 qualifications or International A Levels. |

| Qualification title | Size and structure | Summary purpose |
| --- | --- | --- |
| **Pearson BTEC International Level 3 Foundation Diploma in Artificial Intelligence** | 540 GLH (90 Credits) (720 TQT)<br>Equivalent in size to 1.5 International A Levels.<br>Nine units of which five are mandatory, three are assessed by a Pearson Set Assignment.<br>Mandatory content (56%). | The Foundation Diploma is for students who want to study Artificial Intelligence as a one-year, full-time course, or for those wanting to take it alongside another area of complementary or contrasting study as part of a two-year, full-time study programme. The qualification would support progression to higher education if taken as part of a programme of study that included other BTEC International Level 3 qualifications or International A Levels. |
| **Pearson BTEC International Level 3 Diploma in Artificial Intelligence** | 720 GLH (120 Credits) (960 TQT)<br>Equivalent in size to two International A Levels.<br>Twelve units of which seven are mandatory, five are assessed by a Pearson Set Assignment.<br>Mandatory content (58%). | The Diploma is for students who want to study Artificial Intelligence as the main element alongside another area of complementary or contrasting study as part of a two-year, full-time study programme. The qualification would support progression to higher education if taken as part of a programme of study that included other BTEC International Level 3 qualifications or International A Levels. |

| Qualification title | Size and structure | Summary purpose |
|---|---|---|
| **Pearson BTEC International Level 3 Extended Diploma in Artificial Intelligence** | 1080 GLH (180 Credits) (1200 TQT)<br>Equivalent in size to three International A Levels.<br>Eighteen units of which eleven are mandatory, eight are assessed by a Pearson Set Assignment.<br>Mandatory content (61%). | The Extended Diploma is a full-time course for students who want to study Artificial Intelligence as the main focus of a two-year, full-time study programme.<br>The qualification would support progression to higher education in its own right. This qualification could also directly lead to employment in Level 3 roles in the Artificial Intelligence sector or via higher-education Artificial Intelligence courses. |

## Structures of the qualifications at a glance

This table shows all the units and the qualifications to which they contribute. The full structure for these Pearson BTEC International Level 3 Qualifications in Artificial Intelligence is shown in *Section 3 Structure*.

**You must refer to the full structure to select units and plan your programme.**

**Key**

| | | |
|---|---|---|
| **Pearson Set Assignment units are shown in bold** | M **Mandatory units** | O **Optional units** |

| Unit (number and title) | Unit size (GLH) | Certificate (180 GLH) | Extended Certificate (360 GLH) | Foundation Diploma (540 GLH) | Diploma (720 GLH) | Extended Diploma (1080 GLH) |
|---|---|---|---|---|---|---|
| **1 Introduction to Artificial Intelligence** | 60 | M | M | M | M | M |
| **2 Fundamentals of Machine Learning** | 60 | O | M | M | M | M |
| **3 Data Analysis and Interpretation** | 60 | | | M | M | M |
| **4 Programming for AI** | 60 | O | O | O | M | M |
| **5 Ethics in AI** | 60 | | | | M | M |
| **6 Testing and Evaluation of AI Models** | 60 | O | O | O | O | M |
| **7 Natural Language Processing (NLP)** | 60 | O | O | O | O | M |
| **8 Computer Vision Basics** | 60 | | | | | M |
| 9 AI Algorithms | 60 | | M | M | M | M |
| 10 Hands-on AI Projects | 60 | | | M | M | M |
| 11 AI in Business | 60 | | | | | M |
| 12 Robotics and AI | 60 | O | O | O | O | O |

| Unit (number and title) | Unit size (GLH) | Certificate (180 GLH) | Extended Certificate (360 GLH) | Foundation Diploma (540 GLH) | Diploma (720 GLH) | Extended Diploma (1080 GLH) |
|---|---|---|---|---|---|---|
| 13 AI Programming Techniques | **60** | O | O | O | O | O |
| 14 Mathematical Foundations of Artificial Intelligence | **60** | O | O | O | O | O |
| 15 Big Data in AI | **60** | | O | O | O | O |
| 16 Work Experience | **60** | | O | O | O | O |
| 17 Creating Chatbots | **60** | | | O | O | O |
| 18 AI Tools and Platforms | **60** | | | O | O | O |
| 19 AI for Health | **60** | | | | O | O |
| 20 Cybersecurity and Artificial Intelligence | **60** | | | | O | O |
| 21 AI and Society | **60** | | | | | O |
| 22 AI Project Management | **60** | | | | | O |

# Qualification and unit content

Pearson has developed the content of the new BTEC Internationals in collaboration with representatives from higher education and relevant professional bodies. In this way, we have ensured that content is up to date and that it includes the knowledge, understanding, skills and attributes required in the sector.

Centres should ensure that delivery of content is kept up to date. Some of the units within the specification may contain references to legislation, policies, regulations and organisations, which may not be applicable in the country you deliver this qualification in, or which may have gone out-of-date during the lifespan of the specification. In these instances, it is possible to substitute such references with ones that are current and applicable in the country you deliver in, subject to confirmation by your Standards Verifier.

# Assessment

Assessment is specifically designed to fit the purpose and objective of the qualification. It includes a range of assessment types and styles suited to vocational qualifications in the sector. All assessment is internal but some mandatory units have extra controls on assessment and are assessed using Pearson Set Assignments.

## Pearson Set Assignment (PSA) units

Some units in these qualifications are assessed using a Pearson Set Assignment Brief (PSAB), which is set by Pearson and is marked by teachers. The teachers will make grading decisions based on the requirements and supporting guidance given in the units.

Pearson Set Assignment units are subject to external standards verification processes common to all BTEC units. By setting the assignment for some units, we can ensure that all students take the same set of assessments for a specific unit. For further information on preparing for Pearson Set Assignments, see the *Pearson BTEC International Level 3 Qualifications Supplementary Information* document which is available on our website.

## Internally assessed units

All units in these qualifications are internally assessed and subject to external standards verification. In some units, Pearson will set the assessments using Pearson Set Assignments, which are marked by you. In other units, you set and assess the assignments that provide the final summative assessment for each unit, using the examples and support that Pearson provides. Before you assess you will need to become an approved centre, if you are not one already.

You will need to prepare to assess using the guidance in the *Pearson BTEC International Level 3 Qualifications Supplementary Information* document, which is available on our website.

For units where there is no Pearson Set Assignment, you select the most appropriate assessment styles according to the learning set out in the unit. This ensures that students are assessed using a variety of styles to help them develop a broad range of transferable skills. Students could be given opportunities to:

- write up the findings of their own research
- use case studies to explore complex or unfamiliar situations
- carry out projects for which they have choice over the direction and outcomes
- demonstrate practical and technical skills using appropriate tools/processes, etc.

For these units, Pearson will provide an Authorised Assignment Brief (AAB) that you can use.

You will make grading decisions based on the requirements and supporting guidance given in the units. Where a student has not achieved their expected level of performance for an assignment, they may be eligible for one resubmission of improved evidence for each assignment submitted if authorised by the Lead Internal Verifier.

To ensure any resubmissions are fairly and consistently implemented for all students, the Lead Internal Verifier can only authorise a resubmission if certain conditions are met. If the Lead Internal Verifier does authorise a resubmission, it must be completed within 15 working days of the student receiving the results of the assessment.

Feedback to students can only be given to clarify areas where they have not achieved expected levels of performance. Students cannot receive any specific guidance or instruction about how to improve work to meet assessment criteria or be given solutions to questions or problems in the tasks.

If a student has still not achieved the targeted pass criteria following the resubmission of improved evidence for an assignment, the Lead Internal Verifier may authorise, under exceptional circumstances, one retake opportunity to meet the required pass criteria. The retake can be of a task or subset of the assignment brief that is of evidence in a new or revised form. The deadline for submission of the retake must fall within the same academic year.

## Language of assessment

Assessment of the units for these qualifications will be available in English but can be translated as necessary. A student taking the qualifications may be assessed in sign language where it is permitted for the purpose of reasonable adjustment.

For information on reasonable adjustments see the *Pearson BTEC International Level 3 Qualifications Specification Supplementary Information* document, which is available on our website.

## Grading for units and qualifications

Achievement in a qualification requires a demonstration of depth of study in each unit, assured acquisition of a range of practical skills required for progression to higher education and successful development of transferable skills. Students achieving a qualification will have completed all units.

Units are assessed using a grading scale of Distinction (D), Merit (M), Pass (P) and Unclassified (U). All mandatory and optional units contribute proportionately to the overall qualification grade.

BTEC International qualifications are graded using a scale of P to D*, **or** PP to D*D*, **or** PPP to D*D*D* depending on the size of the qualification. Please see *Section 6* for more details. The relationship between qualification grading scales and unit grades will be subject to regular review as part of Pearson's standards monitoring processes on the basis of student performance and in consultation with key users of the qualification.

# Preparing students for the future

## Transferable skills

Recent future skills reports have highlighted the growing importance of transferable skills for students to succeed in their careers and lives in this fast-changing world.

Following research and consultation with FE educators and higher education institutions, Pearson has developed a Transferable Skills framework to facilitate and guide the development of transferable skills through these qualifications. The framework has four broad skill areas, each with a cluster of transferable skills as shown below:

1. **Managing yourself**: (1) Taking personal responsibility; (2) Personal strengths and resilience; (3) Career orientation planning; (4) Personal goal setting
2. **Effective learning**: (1) Managing own learning; (2) Continuous learning; (3) Secondary research skills; (4) Primary research skills
3. **Interpersonal skills**: (1) Written communication; (2) Verbal and non-verbal communications; (3) Teamwork; (4) Cultural and social intelligence
4. **Solving problems**: (1) Critical thinking; (2) Problem solving; (3) Creativity and innovation.

Each transferable skill has a set of descriptors that outline what achievement of the skill looks like in practice. Each unit in these qualifications will show whether a transferable skill has been:

1. Fully embedded through the design of the teaching and learning content and assessment of the unit. Skills that are embedded are 'naturally occurring' in that they are inherent to the unit content and do not require extension activities to deliver.
2. Signposted as an opportunity for delivery and development and would require extension activities to deliver.

Units will show a summary of the transferable skills that have been embedded or signposted and *Appendix 2* shows the descriptors for each skill across all the skill clusters.

More information on the framework, its design and relevance for student progression is available in the *BTEC Transferable Skills Guide for Teachers.*

## Digital skills

Digital skills are required in every industry as well as in everyday life and, with the acceleration of automation and AI in industry, it is critical for students to understand how digital technologies are relevant and applied in the context of the sector they are studying.

With this in mind, we have used the *Digital Skills Framework* published by the Institute for Apprenticeships and Technical Education (IFATE) as a frame of reference to identify opportunities for the delivery and development of digital skills in this qualification.

The Digital Skills framework for these qualifications has five categories with specific digital characteristics that apply in varying extent across sectors:

1. **Problem solving** – The use of digital tools to analyse and solve problems
2. **Digital collaboration and communication** – Using digital tools to communicate and share information with stakeholders
3. **Transacting digitally** – Using digital tools to set up accounts and pay for goods/services
4. **Digital security** – Identify threats and keep digital tools safe
5. **Handling data safely and securely** – Follow correct procedures when handling personal and organisational data.

Opportunities to develop these digital skills are identified where they are relevant and appropriate to a sector, meaning:

- where they naturally occur
- where they add no assessment burden
- where they will enhance a student's skills and knowledge in the sector.

*Appendix 3* shows a mapping of the teaching and learning content to the five categories of the framework to show where opportunities to develop these digital skills exist in these qualifications .

## Sustainability skills

To help students develop sustainability skills, practices and mindset, we have designed content in these qualifications , aligned to the *UNESCO Sustainable Development Goals* (17 SDGs), that are relevant and appropriate to the sector. The SDGs are the most common point of reference for content that addresses sustainability and provides a useful and pragmatic way of organising this content.

Sustainability knowledge and understanding may be included in the teaching and learning content but not directly assessed. Alternatively, it could be assessed – the approach chosen for each unit is based on the relevance of the sustainability skills, knowledge or understanding to the purpose and scope of the unit.

*Appendix 4* shows a mapping of the teaching and learning content to the relevant SDGs to show where sustainability has been included in these qualifications .

# 2 Qualification purpose

## Pearson BTEC International Level 3 Qualifications in Artificial Intelligence

In this section, you will find information on the purpose of these qualifications and how their design meets that purpose through the qualifications' objectives and structures.

### Who are these qualifications for?

The Pearson BTEC International Level 3 qualifications in Artificial Intelligence are designed either for students in the 16–19 age group, who wish to pursue a career in Artificial Intelligence via higher education to access graduate entry employment with businesses, or alternatively through junior employment.

The qualification can be taken alongside Pearson BTEC International Level 3 qualifications in Creative Digital Media Production, Information Technology, Business, Engineering or Applied Science, enabling students to broaden their technical expertise and enhance progression opportunities into careers spanning artificial intelligence, data science, software development, and other digitally focused industries.

### Which size qualification to choose?

Choosing the most suitable size of qualification will depend on the student's broader programme of study. For example, a student who wishes to focus solely on Artificial Intelligence may take the Diploma or Extended Diploma, while a student who selects a smaller qualification, such as the Certificate or Extended Certificate, may choose to combine it with qualifications from other sectors, to support their desired progression. Smaller qualifications are also suitable for students who are in employment and studying part-time.

Qualification structures have been designed to enable a student who starts with the smallest qualification to progress easily to the larger qualifications.

### What do these qualifications cover?

The content of these qualifications has been designed to support progression to particular roles in Artificial Intelligence, either directly into entry-level roles linked to these occupational areas or, more likely, via particular higher-education routes in the particular areas. The qualification content has been designed in consultation with employers, professional bodies and higher-education providers to ensure that the content is appropriate for the progression routes identified.

All students will be required to take mandatory content that is directly relevant to progression routes in all of the identified areas.

In addition, students take optional units that support the progression route identified in the qualification title. For example, students taking the qualification as part of a work-based learning qualification for Programming could take units such as:

- Programming for AI
- AI Programming Techniques.

Students looking to follow a Business route could take units such as:

- Data Analysis and Interpretation
- AI in Business
- Work Experience.

Additionally, students could choose units that relate to a number of roles in the sector but which contribute to their understanding of those roles in a vocational context, such as:

- AI Project Management
- Hands-on AI Projects.

## What could these qualifications lead to?

These qualifications support progression to job opportunities in the Artificial Intelligence sector at a variety of levels. Jobs available in these areas include:

- AI research assistant
- Entry-level data scientist
- AI software developer/engineer.

These qualifications also support students who are following an Extended Diploma. The jobs available to them will be based on their ability in the Artificial Intelligence sector and will be supported by their achievement of this qualification.

After achieving this qualification, while students can progress directly to entry-level Artificial Intelligence roles, it is likely that many will do so via higher study. These qualifications are recognised by higher education institutions worldwide and provides students with opportunities to progress into further and higher study across various areas within the Artificial Intelligence sector. For example:

- BSc (Hons) in Computing (Artificial Intelligence and Machine Learning)
- BSc (Hons) in Computer Science and Artificial Intelligence
- BSc (Hons) in Artificial Intelligence.

NB: students should always check the entry requirements for degree programmes with the relevant higher education provider.

# 3 Structure

## Qualification structures

The structures for the qualifications in this specification are:

- Pearson BTEC International Level 3 Certificate in Artificial Intelligence (180 GLH)
- Pearson BTEC International Level 3 Extended Certificate in Artificial Intelligence (360 GLH)
- Pearson BTEC International Level 3 Foundation Diploma in Artificial Intelligence (540 GLH)
- Pearson BTEC International Level 3 Diploma in Artificial Intelligence (720 GLH)
- Pearson BTEC International Level 3 Extended Diploma in Artificial Intelligence (1080 GLH).

### Pearson BTEC International Level 3 Certificate in Artificial Intelligence (180 GLH)

Students must complete 1 mandatory unit and 2 optional units.

See *Section 6* for rules on qualification awarding.

**Mandatory units – students complete and achieve all units**

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **1** | Introduction to Artificial intelligence | **60** | **Mandatory** | Set Assignment |

**Optional units – students complete 2 units**

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **2** | Fundamentals of Machine Learning | **60** | **Optional** | Set Assignment |
| **4** | Programming for AI | **60** | **Optional** | Set Assignment |

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **6** | Testing and Evaluation of AI Models | **60** | **Optional** | Set Assignment |
| **7** | Natural Language Processing (NLP) | **60** | **Optional** | Set Assignment |
| **12** | Robotics and AI | **60** | **Optional** | Internal |
| **13** | AI Programming Techniques | **60** | **Optional** | Internal |
| **14** | Mathematical Foundations of Artificial Intelligence | **60** | **Optional** | Internal |

## Pearson BTEC International Level 3 Extended Certificate in Artificial Intelligence (360 GLH)

Students must complete 3 mandatory units and 3 optional units.

See *Section 6* for rules on qualification awarding.

### Mandatory units – students complete and achieve all units

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **1** | Introduction to Artificial intelligence | **60** | **Mandatory** | Set Assignment |
| **2** | Fundamentals of Machine Learning | **60** | **Mandatory** | Set Assignment |
| **9** | AI Algorithms | **60** | **Mandatory** | Internal |

### Optional units – students complete 3 units

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **4** | Programming for AI | **60** | **Optional** | Set Assignment |
| **6** | Testing and Evaluation of AI Models | **60** | **Optional** | Set Assignment |
| **7** | Natural Language Processing (NLP) | **60** | **Optional** | Set Assignment |
| **12** | Robotics and AI | **60** | **Optional** | Internal |
| **13** | AI Programming Techniques | **60** | **Optional** | Internal |
| **14** | Mathematical Foundations of Artificial Intelligence | **60** | **Optional** | Internal |
| **15** | Big Data in AI | **60** | **Optional** | Internal |
| **16** | Work Experience | **60** | **Optional** | Internal |

## Pearson BTEC International Level 3 Foundation Diploma in Artificial Intelligence (540 GLH)

Students must complete 5 mandatory units and 4 optional units.

See *Section 6* for rules on qualification awarding.

### Mandatory units – students complete and achieve all units

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **1** | Introduction to Artificial Intelligence | **60** | **Mandatory** | Set Assignment |
| **2** | Fundamentals of Machine Learning | **60** | **Mandatory** | Set Assignment |
| **3** | Data Analysis and Interpretation | **60** | **Mandatory** | Set Assignment |
| **9** | AI Algorithms | **60** | **Mandatory** | Internal |
| **10** | Hands-on AI Projects | **60** | **Mandatory** | Internal |

### Optional units – students complete 4 units

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **4** | Programming for AI | **60** | **Optional** | Set Assignment |
| **6** | Testing and Evaluation of AI Models | **60** | **Optional** | Set Assignment |
| **7** | Natural Language Processing (NLP) | **60** | **Optional** | Set Assignment |
| **12** | Robotics and AI | **60** | **Optional** | Internal |
| **13** | AI Programming Techniques | **60** | **Optional** | Internal |
| **14** | Mathematical Foundations of Artificial Intelligence | **60** | **Optional** | Internal |
| **15** | Big Data in AI | **60** | **Optional** | Internal |
| **16** | Work Experience | **60** | **Optional** | Internal |

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **17** | Creating Chatbots | **60** | **Optional** | Internal |
| **18** | AI Tools and Platforms | **60** | **Optional** | Internal |

## Pearson BTEC International Level 3 Diploma in Artificial Intelligence (720 GLH)

Students must complete 7 mandatory units and 5 optional units.

See *Section 6* for rules on qualification awarding.

### Mandatory units – students complete and achieve all units

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **1** | Introduction to Artificial Intelligence | **60** | **Mandatory** | Set Assignment |
| **2** | Fundamentals of Machine Learning | **60** | **Mandatory** | Set Assignment |
| **3** | Data Analysis and Interpretation | **60** | **Mandatory** | Set Assignment |
| **4** | Programming for AI | **60** | **Mandatory** | Set Assignment |
| **5** | Ethics in AI | **60** | **Mandatory** | Set Assignment |
| **9** | AI Algorithms | **60** | **Mandatory** | Internal |
| **10** | Hands-on AI Projects | **60** | **Mandatory** | Internal |

### Optional units – students complete 5 units

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **6** | Testing and Evaluation of AI Models | **60** | **Optional** | Set Assignment |
| **7** | Natural Language Processing (NLP) | **60** | **Optional** | Set Assignment |
| **12** | Robotics and AI | **60** | **Optional** | Internal |
| **13** | AI Programming Techniques | **60** | **Optional** | Internal |
| **14** | Mathematical Foundations of Artificial Intelligence | **60** | **Optional** | Internal |
| **15** | Big Data in AI | **60** | **Optional** | Internal |

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **16** | Work Experience | **60** | **Optional** | Internal |
| **17** | Creating Chatbots | **60** | **Optional** | Internal |
| **18** | AI Tools and Platforms | **60** | **Optional** | Internal |
| **19** | AI for Health | **60** | **Optional** | Internal |
| **20** | Cybersecurity and Artificial Intelligence | **60** | **Optional** | Internal |

## Pearson BTEC International Level 3 Extended Diploma in Artificial Intelligence (1080 GLH)

Students must complete 11 mandatory units and 7 optional units.

See *Section 6* for rules on qualification awarding.

### Mandatory units – students complete and achieve all units

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **1** | Introduction to Artificial Intelligence | **60** | **Mandatory** | Set Assignment |
| **2** | Fundamentals of Machine Learning | **60** | **Mandatory** | Set Assignment |
| **3** | Data Analysis and Interpretation | **60** | **Mandatory** | Set Assignment |
| **4** | Programming for AI | **60** | **Mandatory** | Set Assignment |
| **5** | Ethics in AI | **60** | **Mandatory** | Set Assignment |
| **6** | Testing and Evaluation of AI Models | **60** | **Mandatory** | Set Assignment |
| **7** | Natural Language Processing (NLP) | **60** | **Mandatory** | Set Assignment |
| **8** | Computer Vision Basics | **60** | **Mandatory** | Set Assignment |
| **9** | AI Algorithms | **60** | **Mandatory** | Internal |
| **10** | Hands-on AI Projects | **60** | **Mandatory** | Internal |
| **11** | AI in Business | **60** | **Mandatory** | Internal |

**Optional units – students complete 7 units**

| Unit number | Unit title | GLH | Type | How assessed |
|---|---|---|---|---|
| **12** | Robotics and AI | **60** | **Optional** | Internal |
| **13** | AI Programming Techniques | **60** | **Optional** | Internal |
| **14** | Mathematical Foundations of Artificial Intelligence | **60** | **Optional** | Internal |
| **15** | Big Data in AI | **60** | **Optional** | Internal |
| **16** | Work Experience | **60** | **Optional** | Internal |
| **17** | Creating Chatbots | **60** | **Optional** | Internal |
| **18** | AI Tools and Platforms | **60** | **Optional** | Internal |
| **19** | AI for Health | **60** | **Optional** | Internal |
| **20** | Cybersecurity and Artificial Intelligence | **60** | **Optional** | Internal |
| **21** | AI and Society | **60** | **Optional** | Internal |
| **22** | AI Project Management | **60** | **Optional** | Internal |

## Pearson Set Assignment units

This is a summary of the type and availability of Pearson Set Assignment units. For further information on preparing for Pearson Set Assignments, see the *Pearson BTEC International Level 3 Qualifications Supplementary Information* document which is available on our website.

| Unit | Type | Availability |
|---|---|---|
| **Unit 1: Introduction to Artificial Intelligence** | An assignment set by Pearson and marked by the centre.<br>The advised period is 9 hours. | **Bank** |
| **Unit 2: Fundamentals of Machine Learning** | An assignment set by Pearson and marked by the centre.<br>The advised period is 9 hours. | **Bank** |
| **Unit 3: Data Analysis and Interpretation** | An assignment set by Pearson and marked by the centre.<br>The advised period is 9 hours. | **Bank** |
| **Unit 4: Programming for AI** | An assignment set by Pearson and marked by the centre.<br>The advised period is 9 hours. | **Bank** |
| **Unit 5: Ethics in AI** | An assignment set by Pearson and marked by the centre.<br>The advised period is 9 hours. | **Bank** |
| **Unit 6: Testing and Evaluation of AI Models** | An assignment set by Pearson and marked by the centre.<br>The advised period is 9 hours. | **Bank** |
| **Unit 7: Natural Language Processing (NLP)** | An assignment set by Pearson and marked by the centre.<br>The advised period is 9 hours. | **Bank** |
| **Unit 8: Computer Vision Basics** | An assignment set by Pearson and marked by the centre.<br>The advised period is 9 hours. | **Bank** |

# 4 Units

## Understanding your units

The units in this specification set out our expectations of assessment in a way that helps you to prepare your students for assessment. The units help you to undertake assessment and quality assurance effectively.

This section explains how the units work. It is important that all teachers, assessors, internal verifiers and other staff responsible for the programme review this section.

| Section | Explanation |
|---|---|
| **Unit number** | The number is in a sequence in the sector. Numbers may not be sequential for an individual qualification. |
| **Unit title** | This is the formal title that we always use and it appears on certificates. |
| **Unit level** | All units are at Level 3. |
| **Unit type** | This confirms that the unit is internal or assessed using a Pearson Set Assignment. See structure information in *Section 3 Structure* for full details. |
| **GLH** | Units have a Guided Learning Hours (GLH) value of 60. This indicates the numbers of hours of teaching, directed activity and assessment expected. It also shows the weighting of the unit in the final qualification grade. |
| **Unit in brief** | A brief formal statement on the content of the unit that is helpful in understanding its role in the qualification. You can use this in summary documents, brochures, etc. |
| **Unit introduction** | This is designed with students in mind. It indicates why the unit is important, how learning is structured, and how learning might be applied when progressing to employment or higher education. |
| **Learning aims** | These help to define the scope, style and depth of learning of the unit. You can see where students should be learning standard requirements ('understand') or where they should be actively researching ('investigate'). You can find out more about the verbs we use in learning aims in *Appendix 1*. |

| Section | Explanation |
|---|---|
| **Summary of unit** | This helps you to see the main content areas against the learning aims and the structure of the assessment at a glance. |
| **Content** | This sets out the required teaching content of the unit. Content is compulsory except where shown as 'e.g.'. Students should be asked to complete summative assessment only after the teaching content for the unit or learning aim(s) has been covered. |
| **Assessment criteria** | Each learning aim has Pass and Merit criteria. Each assignment has at least one Distinction criterion. A full glossary of terms used is given in *Appendix 1*.<br>Distinction criteria represent outstanding performance in the unit. Some criteria require students to draw together learning from across the learning aims. |
| **Transferable skills** | This summarises the transferable skills present within the unit. The key helps to identify whether they are signposted but require additional assessment, embedded and achieved on completion, or not present in the unit. |
| **Essential information for Pearson Set Assignment Brief (PSAB)** | This shows a brief summary of the activities required for the mandatory Pearson Set Assignment Brief (PSAB). Centres must download and use the mandatory PSAB without alteration or contextualisation. |
| **Essential information for assignments** | This section gives you information to support the implementation of assessment. It is important that this is read carefully alongside the assessment criteria, as the information will help with interpretation of the requirements. |
| **Further information for teachers and assessors** | This gives you information to support the implementation of assessment. It is important that this is used carefully alongside the assessment criteria and assignment. |
| **Resource requirements** | Any specific resource requirements that you need to be able to teach and assess are listed in this section. |
| **Essential information for assessment decisions** | This information gives guidance for each learning aim or assignment of the expectations for Pass, Merit and Distinction standard. This section contains examples and essential clarification. |

| Section | Explanation |
| --- | --- |
| **Links to other units** | This shows you the main relationship between units. This can help you to structure your programme and make best use of materials and resources. |

# Index of units

# Unit 1: Introduction to Artificial Intelligence

**Level:** 3

**Unit type:** Pearson Set Assignment

**Guided learning hours:** 60

## Unit in brief

This unit introduces the key concepts, development and uses of artificial intelligence. Students also consider ethical and societal impacts, supporting progression to further study or employment in digital technologies.

## Unit introduction

Artificial intelligence (AI) is transforming the way organisations operate and how individuals interact with digital systems. From recommendation engines and intelligent assistants to healthcare diagnostics and autonomous vehicles, AI is now integral to modern society and the global economy.

In this unit you will be introduced to the fundamental concepts, systems and real-world applications of artificial intelligence. You will explore how AI has developed, how modern AI systems function, and how AI techniques are applied to practical problems in a range of contexts. The unit also encourages students to consider ethical, social and legal implications of AI deployment.

The unit is designed to support progression to further study, higher education or apprenticeships; and employment in areas such as computing, data science, digital technologies, engineering, business analytics and emerging technology sectors.

## Learning aims

In this unit you will:

**A** Understand the foundations of AI

**B** Investigate how AI systems work and are developed

**C** Apply AI concepts to real-world contexts.

  

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand the foundations of AI | **A1** Artificial intelligence: definition and scope<br>**A2** Historical development of artificial intelligence<br>**A3** Core concepts underpinning artificial intelligence<br>**A4** Opportunities, challenges and ethical considerations | This unit is assessed through a Pearson Set Assignment. |
| **B** Investigate how AI systems work and are developed | **B1** Components of artificial intelligence systems<br>**B2** AI techniques and approaches<br>**B3** The AI development lifecycle<br>**B4** Tools and environments for AI development | |
| **C** Apply AI concepts to real-world contexts | **C1** AI use cases in different sectors<br>**C2** Evaluating AI solutions<br>**C3** Practical application of AI concepts<br>**C4** Impact of artificial intelligence | |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand the foundations of AI

#### A1 Artificial intelligence: definition and scope

The essential content topics require students to apply the following knowledge:

- What is meant by artificial intelligence:
  - AI as computer systems designed to perform tasks that normally require human intelligence
  - examples of intelligent behaviour: learning, reasoning, perception, language understanding, decision-making.
- Different types of AI:
  - Narrow (Weak) AI: systems designed for specific tasks (e.g. recommendation systems, voice assistants)
  - General (Strong) AI: theoretical systems capable of human-level intelligence across domains
  - Artificial Superintelligence: speculative future concept.
- The relationship between:
  - artificial intelligence
  - machine learning
  - deep learning
  - data science.
- The goals and purposes of AI systems:
  - automation
  - prediction and forecasting
  - pattern recognition
  - decision support.

#### A2 Historical development of artificial intelligence

The essential content topics require students to apply the following knowledge:

- Early ideas and origins of AI:
  - symbolic reasoning and logic-based systems
  - early computing concepts and decision machines.

- Key milestones in AI development:
    - expert systems and rule-based AI
    - periods of high expectation and AI winters
    - revival through machine learning.
- Transition to modern AI:
    - increased availability of data (big data)
    - improvements in hardware (GPUs and cloud computing)
    - advances in algorithms.
- The role of academic research, industry and government investment in AI development.

### A3 Core concepts underpinning artificial intelligence

The essential content topics require students to apply the following knowledge:

- Algorithms:
    - step-by-step instructions for solving problems
    - deterministic vs probabilistic algorithms.
- Data:
    - structured and unstructured data
    - training, validation and test datasets
    - data quality, completeness and relevance.
- Learning and adaptation:
    - learning from examples rather than explicit rules
    - pattern detection and generalisation.
- Overview of learning approaches:
    - supervised learning (labelled data)
    - unsupervised learning (unlabelled data)
    - reinforcement learning (reward-based decision-making).

### A4 Opportunities, challenges and ethical considerations

The essential content topics require students to apply the following knowledge:

- Benefits of AI:
    - increased efficiency and accuracy
    - ability to process large volumes of data
    - innovation and new services.
- Limitations of AI:
    - dependence on quality data
    - lack of true understanding or consciousness
    - errors and misclassification.

 

- Ethical concerns:
  - bias in data and algorithms
  - transparency and explainability
  - privacy and surveillance
  - accountability for AI decisions.
- Legal and societal considerations:
  - data protection
  - trust in automated decision-making
  - impact on employment and skills.

## Learning aim B: Investigate how AI systems work and are developed

### B1 Components of artificial intelligence systems

The essential content topics require students to apply the following knowledge:

- Inputs:
  - sensor data, text, images, numerical datasets.
- Data preprocessing:
  - cleaning data
  - handling missing or incorrect values
  - normalisation and feature selection.
- Models:
  - mathematical representations of relationships in data
  - how models are trained and adjusted.
- Outputs:
  - predictions, classifications or recommendations
  - confidence levels or probabilities.
- Feedback loops:
  - continuous improvement of models through new data.

### B2 AI techniques and approaches

The essential content topics require students to apply the following knowledge:

- Machine learning models:
  - classification models (e.g. spam detection)
  - regression models (e.g. forecasting).
- Rule-based systems:
  - If-then logic
  - use in expert systems.

- Decision trees:
  - branching logic for decisions
  - interpretability advantages.
- Neural networks:
  - inspiration from biological neurons
  - layers, weights and activation functions
  - difference between shallow and deep networks.
- Introduction to:
  - natural language processing
  - computer vision.

**B3 The AI development lifecycle**

The essential content topics require students to apply the following knowledge:

- Problem definition:
  - identifying suitable problems for AI
  - defining success criteria.
- Data collection:
  - ethical data sourcing
  - quantity vs quality considerations.
- Model selection and training:
  - choosing suitable techniques
  - training models using datasets.
- Testing and evaluation:
  - accuracy, precision, recall
  - bias and error analysis.
- Deployment:
  - integrating AI into systems
  - user interaction and monitoring.
- Maintenance:
  - retraining models
  - updating datasets.

**B4 Tools and environments for AI development**

The essential content topics require students to apply the following knowledge:

- Programming languages commonly used in AI.
- Visual, low-code or no-code AI platforms.
- Pre-built AI services and APIs.
- Open datasets and ethical data use.

## **Learning aim C: Apply AI concepts to real-world contexts** [EL-MOL]

### C1 AI use cases in different sectors

The essential content topics require students to apply the following knowledge:

- Business and finance:
  - risk assessment
  - market analysis.
- Healthcare:
  - diagnostic support
  - predictive healthcare.
- Education:
  - personalised learning
  - automated assessment.
- Transport and smart systems:
  - traffic prediction
  - autonomous technologies.

### C2 Evaluating AI solutions

The essential content topics require students to apply the following knowledge:

- When AI is an appropriate solution.
- Benefits compared to traditional systems.
- Technical feasibility.
- Ethical and social implications.
- Risks and limitations.

### C3 Practical application of AI concepts

The essential content topics require students to apply the following knowledge:

- Use of appropriate AI tools to analyse datasets.
- Build simple predictive or classification models.
- Interpret AI outputs and explain decisions.
- Communicate findings to non-technical audiences.

### C4 Impact of artificial intelligence

The essential content topics require students to apply the following knowledge:

- Employment and workforce changes.
- Skills for an AI-enabled future.
- Responsible innovation.
- Sustainability and long-term effects.

  

## Assessment criteria

### Learning aim A: Understand the foundations of AI

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Identify different types of artificial intelligence systems.<br>**A.P2** Describe what is meant by artificial intelligence.<br>**A.P3** Outline the key concepts and historical developments that have contributed to the development of modern artificial intelligence. | **A.M1** Analyse the opportunities and limitations of different types of artificial intelligence systems. | **A.D1** Evaluate the ethical, legal and societal implications of artificial intelligence systems. |

### Learning aim B: Investigate how AI systems work and are developed

| Pass | Merit | Distinction |
|---|---|---|
| **B.P4** Describe the main components of an artificial intelligence system and their roles within the system.<br>**B.P5** Outline the stages of the artificial intelligence development lifecycle. | **B.M2** Explain how artificial intelligence techniques, development tools and environments are selected and used to solve specific problems. | **B.D2** Analyse the effectiveness of an artificial intelligence system by evaluating its development process, performance, limitations and issues. |



 

## Learning aim C: Apply AI concepts to real-world contexts

| Pass | Merit | Distinction |
|---|---|---|
| **C.P6** Explain the purpose of a selected artificial intelligence system used in a given sector.<br>**C.P7** Propose a basic artificial intelligence system for a given problem. | **C.M3** Explain how an artificial intelligence solution addresses the given problem. | **C.D3** Evaluate the effectiveness and appropriateness of an artificial intelligence solution to a given problem. [SP-CT] |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL * | IS – WC | SP – CT √ |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS √ |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for Pearson Set Assignment (PSA)

Pearson sets the assignment for the assessment of this unit:

The PSA will take 9 hours to complete.

The PSA will be marked by centres and verified by Pearson.

The PSA will be valid for the lifetime of this qualification.

### Assessing the PSA

You will make assessment decisions for the PSA using the assessment criteria provided.

The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on PSAs. There is also further information on our website.

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

**Hardware**

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

**Software and digital tools**

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

**Data resources**

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students are expected to demonstrate evaluative and critical thinking. They should evaluate the ethical, legal and societal implications of artificial intelligence, making balanced and reasoned judgements about the benefits, risks and long-term consequences of AI technologies. Students should consider multiple perspectives and support their judgements with justified conclusions. Evidence should demonstrate insight, independence and the ability to synthesise knowledge into informed evaluations, rather than relying on descriptive or explanatory approaches only.

**For merit standard**, students are expected to go beyond description and provide clear explanations of the fundamental concepts of artificial intelligence. They should explain how data, algorithms and different learning approaches interact within AI systems and demonstrate understanding of how these elements contribute to intelligent behaviour. Students should analyse the opportunities and limitations of AI systems, considering practical, technical or societal factors. Evidence at this level should show increased depth, logical structure and appropriate use of technical language, supported by relevant examples. Students should demonstrate an understanding of why concepts are important and how they relate to real-world use.

**For pass standard**, students are expected to demonstrate basic but accurate understanding of artificial intelligence. They should be able to clearly describe what artificial intelligence is and identify different types of AI systems, such as narrow and general artificial intelligence. Students should outline key stages in the historical development of AI and identify key concepts that underpin modern AI systems. Responses at this level are likely to be descriptive in nature and may rely on taught content or familiar examples. The evidence should show correct use of basic terminology and an absence of significant factual errors. However it is not expected to demonstrate depth of analysis or evaluation.

### Learning aim B

**For distinction standard**, students are expected to analyse the effectiveness of artificial intelligence systems in depth. They should evaluate how development decisions, such as data quality, model selection and evaluation methods, affect system performance. Students should consider limitations, including accuracy, bias, reliability and suitability for use in real-world contexts. Evidence should demonstrate critical analysis supported by relevant examples or investigation. Evidence should also include clear, justified conclusions regarding system strengths and weaknesses.

**For merit standard**, students should explain how artificial intelligence techniques are selected and used within a development process. They should demonstrate understanding of how data is prepared, how models are trained, and how systems are tested and evaluated. Students should investigate at least one AI development tool or environment and explain how it supports the development of AI systems. Evidence should be supported by investigation or practical exploration, and should clearly link technical choices to system outcomes. The work should demonstrate reasoning, clarity and consistent use of appropriate terminology.

**For pass standard**, students are expected to describe the main components of an artificial intelligence system, such as inputs, data processing stages, models and outputs. They should outline the stages of the AI development lifecycle, from defining the problem through to deployment and maintenance. Evidence at this level may be chronological and descriptive, showing an awareness of how AI systems are created. However students are not expected to include detailed explanation of why specific approaches are chosen. Students should demonstrate a basic understanding of AI development tools or environments, but are not expected to analyse their effectiveness.

## Learning aim C

**For distinction standard**, students are expected to evaluate the effectiveness and appropriateness of an artificial intelligence solution to a given problem. They should make reasoned judgements about how well the solution meets the needs of the context, considering technical performance, suitability for users, ethical implications, practical constraints and potential risks. Evidence should show that students can draw together relevant information about the problem, the proposed AI solution and its likely impact. Conclusions should be justified and may include recommendations for improvement or alternative approaches.

**For merit standard**, students are expected to explain how an artificial intelligence solution addresses the given problem. They should show clear understanding of how the main features of the solution respond to the needs of the context and how relevant AI concepts support its intended purpose. Evidence should include logical links between the problem, the selected or proposed solution, and the expected benefits and limitations. Students may draw on investigation or practical exploration to support their explanation, but the focus should remain on how the solution addresses the problem.

**For pass standard**, students are expected to demonstrate basic applied understanding of artificial intelligence in real-world contexts. They should explain the purpose of a selected AI system used in a given sector, showing awareness of what the system is intended to do and who or what it supports. They should also propose a basic artificial intelligence system for a given problem. The proposed system should be simple, relevant to the context and show some appropriate use of AI concepts. Evidence at this level is likely to be descriptive and should show clear links between the selected sector, the given problem and the proposed AI-based response.

## Links to other units

This unit links to:

- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 13: AI Programming Techniques
- Unit 15: Big Data in AI
- Unit 16: Work Experience
- Unit 19: AI for Health
- Unit 21: AI and Society

# Unit 2: Fundamentals of Machine Learning

**Level:** 3

**Unit type:** Pearson Set Assignment

**Guided learning hours:** 60

## Unit in brief

This unit introduces machine learning as a core area of artificial intelligence. It establishes the principles, methods, applications and responsible-use considerations that underpin machine learning systems across vocational sectors.

## Unit introduction

Machine learning is a core area of artificial intelligence that enables systems to learn patterns from data and improve performance without being explicitly programmed for every task. Machine learning techniques are used widely across modern industries, including business analytics, healthcare, finance, education, cybersecurity and smart technologies.

In this unit you will build on your introductory understanding of artificial intelligence by focusing specifically on the fundamental principles, methods and applications of machine learning. You will explore how machine learning systems are developed, trained, tested and evaluated.

The unit is designed to support progression to further study, higher education or apprenticeships; and employment in areas such as computing, data science, digital technologies, engineering, business analytics and emerging technology sectors.

## Learning aims

In this unit you will:

**A** Understand machine learning concepts and technologies

**B** Explore the development and testing of machine learning systems

**C** Apply machine learning concepts to real-world contexts.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand machine learning concepts and technologies | **A1** Artificial intelligence and machine learning fundamentals<br>**A2** Types of machine learning<br>**A3** Data and algorithms in machine learning<br>**A4** Benefits and limitations of machine learning technologies | This unit is assessed through a Pearson Set Assignment. |
| **B** Explore the development and testing of machine learning systems | **B1** The machine learning development process<br>**B2** Training and testing machine learning models<br>**B3** Tools and environments for machine learning | |
| **C** Apply machine learning concepts to real-world contexts | **C1** Machine learning applications in real-world contexts<br>**C2** Applying machine learning concepts to problems<br>**C3** Evaluating machine learning solutions<br>**C4** Vocational impact of machine learning | |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand machine learning concepts and technologies

#### A1 Artificial intelligence and machine learning fundamentals

The essential content topics require students to apply the following knowledge:

- The definition of artificial intelligence as systems designed to perform tasks that typically require human intelligence, such as learning, reasoning and decision-making.
- The role of machine learning as a method that allows AI systems to learn from data rather than relying solely on predefined rules.
- The distinction between:
  - artificial intelligence
  - machine learning
  - deep learning.
- The importance of machine learning in enabling modern AI applications.
- Examples of everyday systems that rely on machine learning, such as music and video recommendations, search engines, fraud detection and voice recognition.

Students should understand that machine learning is a core enabling technology within artificial intelligence rather than a separate field.

#### A2 Types of machine learning

The essential content topics require students to apply the following knowledge:

- Supervised learning:
  - learning from labelled datasets
  - common use cases such as classification and prediction
  - examples including spam detection, image recognition and price prediction.
- Unsupervised learning:
  - learning from unlabelled datasets
  - identification of patterns, structures or groups within data
  - examples such as customer segmentation or anomaly detection.
- Reinforcement learning:
  - learning through trial and error using rewards and penalties
  - use in environments where decisions affect future outcomes
  - examples such as game-playing systems and autonomous control.

Students should be able to describe the key characteristics of each learning type and recognise when each approach would be appropriate.

### A3 Data and algorithms in machine learning

The essential content topics require students to apply the following knowledge:

- Types of data used in machine learning:
  - numerical data
  - categorical data
  - text data
  - image and audio data.
- The concept of datasets, including:
  - training datasets
  - validation datasets
  - testing datasets.
- The importance of data quality, including accuracy, completeness, relevance and bias.
- The role of algorithms in identifying patterns and relationships within data.
- The idea that different algorithms and data choices can lead to different outcomes.

Students should understand that data-driven decision-making is fundamental to machine learning performance.

### A4 Benefits and limitations of machine learning technologies

The essential content topics require students to apply the following knowledge:

- Benefits such as:
  - automation of complex tasks
  - ability to handle large volumes of data
  - improved consistency and efficiency.
- Limitations such as:
  - dependence on high-quality data
  - bias and unfairness
  - lack of transparency in complex models
  - errors and misclassification.

Students should understand that machine learning is a powerful but not universally suitable solution.

## Learning aim B: Explore the development and testing of machine learning systems

### B1 The machine learning development process

The essential content topics require students to apply the following knowledge:

- Identifying and defining a suitable problem.
- Determining whether machine learning is an appropriate solution.
- Data collection and sourcing, including ethical considerations.
- Data preparation, cleaning and transformation.
- Selection of appropriate machine learning techniques.
- Training models using prepared data.
- Testing and evaluating system performance.
- Deployment and integration into real-world systems.
- Monitoring, maintenance and updating of models.

Students should understand that machine learning systems are iterative and require ongoing management.

### B2 Training and testing machine learning models

The essential content topics require students to apply the following knowledge:

- How machine learning models learn patterns during training.
- The purpose of separating data into training and testing sets.
- Performance measures such as accuracy and error rates.
- Concepts such as overfitting and underfitting.
- How poor data quality affects performance and reliability.

Students should understand that testing and evaluation are critical to ensuring reliable and trustworthy AI systems.

### B3 Tools and environments for machine learning

The essential content topics require students to apply the following knowledge:

- Programming-based machine learning environments.
- Visual, low-code or no-code AI tools.
- Pre-trained models and cloud-based AI services.
- The benefits and limitations of different development tools.

Students should consider how tool selection affects accessibility, efficiency and control.

Students should understand the professional responsibility involved in developing and deploying machine learning systems.

## Learning aim C: Apply machine learning concepts to real-world contexts
[EL-MOL]

### C1 Machine learning applications in real-world contexts

The essential content topics require students to apply the following knowledge:

- Understand how machine learning adds value and transforms processes within these sectors:
  - business and finance
  - healthcare
  - education
  - security and risk management
  - retail and customer services.

### C2 Applying machine learning concepts to problems

The essential content topics require students to apply the following knowledge:

- Identify problems suitable for machine learning solutions.
- Propose appropriate machine learning approaches.
- Consider data requirements and constraints.
- Interpret outputs and predictions.

### C3 Evaluating machine learning solutions

The essential content topics require students to apply the following knowledge:

- Effectiveness and accuracy.
- Benefits and limitations.
- Ethical and legal implications.
- Practical suitability in context.

### C4 Vocational impact of machine learning

The essential content topics require students to apply the following knowledge:

- The impact of machine learning on job roles and industries.
- Skills required for working with machine learning systems.
- The importance of responsible innovation.


 

## Assessment criteria

### Learning aim A: Understand machine learning concepts and technologies

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Explain how machine learning fits within artificial intelligence systems.<br>**A.P2** Describe the main types of machine learning.<br>**A.P3** Outline the role of data and algorithms in machine learning systems. | **A.M1** Explain how different machine learning approaches are used to solve different types of problems. | **A.D1** Evaluate the suitability of machine learning technologies for different applications. |

### Learning aim B: Explore the development and testing of machine learning systems

| Pass | Merit | Distinction |
|---|---|---|
| **B.P4** Describe the stages involved in the development of machine learning systems.<br>**B.P5** Describe methods used to train and test machine learning models. | **B.M2** Explain how development stages influence the performance, reliability and responsible use of machine learning systems. | **B.D2** Evaluate the development and testing of a machine learning system. |

### Learning aim C: Apply machine learning concepts to real-world contexts

| Pass | Merit | Distinction |
|---|---|---|
| **C.P6** Explain the purpose of a machine learning system used in a given sector.<br>**C.P7** Propose a basic machine learning solution for a given problem. | **C.M3** Explain how a proposed machine learning solution addresses a given problem. | **C.D3** Evaluate the effectiveness and appropriateness of a machine learning solution to a given problem. [SP-CT] |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL * | IS – WC | SP – CT √ |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS √ |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for Pearson Set Assignment (PSA)

Pearson sets the assignment for the assessment of this unit.

The PSA will take 9 hours to complete.

The PSA will be marked by centres and verified by Pearson.

The PSA will be valid for the lifetime of this qualification.

### Assessing the PSA

You will make assessment decisions for the PSA using the assessment criteria provided.

The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on PSAs. There is also further information on our website.

# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should make reasoned judgements about the suitability of machine learning technologies for different applications and contexts. They should evaluate, not just describe or explain. This means they must apply criteria such as reliability, accuracy, fairness, transparency, practicality and appropriateness to a situation and come to a justified conclusion.

**For merit standard**, students should explain machine learning concepts rather than merely describing them. They should demonstrate that they understand how different learning approaches map to different kinds of problems, and they should use appropriate examples to show this understanding. For example, they might explain why supervised learning is used when labelled outcomes are available, or why clustering may be useful for segmenting customers without labels.

**For pass standard**, students should present accurate descriptions of artificial intelligence and how machine learning fits into AI systems. They should describe the main categories of machine learning, typically including supervised learning, unsupervised learning and reinforcement learning. Students should outline the role that data and algorithms play in enabling a machine learning model to make predictions or decisions. A student working at Pass level will usually explain ideas in a straightforward way, will use basic terminology correctly and will provide examples that are plausible, even if they are not explored in depth.

### Learning aim B

**For distinction standard**, students should evaluate the development and testing of a machine learning system using clear, justified judgement. They should consider effectiveness, reliability and responsibility together and show awareness that these factors often conflict and require trade-offs.

**For merit standard**, students should explain how decisions made during the lifecycle affect system performance and reliability. They should show that they understand that model performance depends heavily on data preparation, the quality and representativeness of data and the method used for training and testing. They should be able to explain concepts such as overfitting and underfitting in terms of outcomes, such as a model performing well on training data but poorly on unseen data.

**For pass standard**, students should describe the key stages involved in developing a machine learning system, from defining a problem through data collection and preparation, model training, testing and evaluation and into deployment and monitoring. They should describe basic methods used to train and test models. Students should also identify ethical considerations related to the use of data and automated decisions.

## Learning aim C

**For distinction standard,** students are expected to evaluate the effectiveness and appropriateness of a machine learning solution to a given problem. They should make reasoned judgements about how well the solution meets the needs of the context, considering technical performance, suitability for users, practical constraints and potential risks. Evidence should show that students can draw together relevant information about the problem, the proposed machine learning solution and its likely impact. Conclusions should be justified and may include recommendations for improvement or alternative approaches.

**For merit standard**, students are expected to explain how a machine learning solution addresses the given problem. They should show clear understanding of how the main features of the solution respond to the needs of the context and how relevant machine learning concepts support its intended purpose. Evidence should include logical links between the problem, the selected or proposed solution and the expected benefits and limitations. Students may draw on investigation or practical exploration to support their explanation, but the focus should remain on how the solution addresses the problem.

**For pass standard**, students are expected to demonstrate basic applied understanding of machine learning in real-world contexts. They should explain the purpose of a selected machine learning system used in a given sector, showing awareness of what the system is intended to do and who or what it supports. They should also propose a basic machine learning solution for a given problem. The proposed system should be simple, relevant to the context and show some appropriate use of machine learning concepts. Evidence at this level is likely to be descriptive and should show clear links between the selected sector, the given problem and the proposed machine learning response.


 

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 13: AI Programming Techniques
- Unit 15: Big Data in AI
- Unit 16: Work Experience
- Unit 17: Creating Chatbots
- Unit 19: AI for Health
- Unit 21: AI and Society

# Unit 3: Data Analysis and Interpretation

**Level:** 3

**Unit type:** Pearson Set Assignment

**Guided learning hours:** 60

## Unit in brief

This unit introduces the principles and practices of data analysis within artificial intelligence systems. Students develop the skills to analyse and interpret data, evaluate AI-driven insights and consider ethical and vocational implications.

## Unit introduction

Data analysis and interpretation are at the heart of artificial intelligence systems. AI relies on data to identify patterns, make predictions, support decision-making and automate processes across a wide range of sectors. Understanding how data is collected, prepared, analysed and interpreted is therefore essential for anyone studying or working with artificial intelligence technologies.

In this unit, you will learn how data analysis supports artificial intelligence systems. You will explore how data is collected, prepared, analysed, interpreted, how data quality affects the reliability, fairness and trust in AI-supported decisions.

The unit emphasises both technical understanding and responsible practice, preparing students for further study in computing, data science or AI, as well as employment in data-driven and digital roles.

## Learning aims

In this unit you will:

**A** Understand data analysis and data quality in AI systems

**B** Explore how data is used in the AI development lifecycle

**C** Apply data analysis techniques to support AI decisions.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand data analysis and data quality in AI systems | **A1** The role of data in artificial intelligence<br>**A2** Types of data used in AI systems<br>**A3** Data analysis techniques in AI<br>**A4** Data quality and limitations | This unit is assessed through a Pearson Set Assignment. |
| **B** Explore how data is used in the AI development cycle | **B1** Data within the AI development lifecycle<br>**B2** Testing and evaluating data-driven AI systems<br>**B3** Ethical implications of data use in AI<br>**B4** Legal and social considerations | |
| **C** Apply data analysis techniques to support AI decisions | **C1** Data analysis in vocational contexts<br>**C2** Applying data analysis techniques<br>**C3** Evaluating AI-supported insights<br>**C4** The impact of data-driven AI in the workplace | |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand data analysis and data quality in AI systems

#### A1 The role of data in artificial intelligence

The essential content topics require students to apply the following knowledge:

- The role of data as the input that enables AI systems to learn, adapt and make decisions.
- The difference between traditional rule-based systems and data-driven AI systems.
- How historical data and real-time data are used in AI models.
- The relationship between data analysis, machine learning and automated decision-making.
- How data analysis underpins both predictive AI systems and generative AI systems.
- Examples of AI systems that depend on data analysis, such as fraud detection systems, recommendation engines, forecasting tools and risk assessment systems.

Students should understand that AI systems are only as effective as the data and analysis used to support them; and that data analysis underpins accuracy, reliability and trust.

#### A2 Types of data used in AI systems

The essential content topics require students to apply the following knowledge:

- Quantitative data, such as numerical measurements and counts.
- Qualitative data, such as descriptive text or user feedback.
- Structured data, including tabular datasets stored in databases or spreadsheets.
- Semi-structured data, such as logs or formatted text.
- Unstructured data, including images, audio and free-text data.

Students should consider data sources such as sensors, user interactions, transactional systems, surveys and publicly available datasets. They will also examine the difference between labelled and unlabelled data and how this distinction affects AI techniques and outcomes.

#### A3 Data analysis techniques in AI

The essential content topics require students to apply the following knowledge:

- Data summarisation and aggregation.
- Descriptive statistics used to understand datasets.
- Identification of patterns and trends within data.
- Feature selection and extraction to support AI model performance.

- Data visualisation techniques, such as charts and graphs, used to support interpretation and communication of results.
- Understanding the difference between correlation and causation, and why incorrect interpretation can lead to poor AI decisions.

The emphasis is on conceptual understanding and interpretation, rather than advanced mathematical computation.

### A4 Data quality and limitations

The essential content topics require students to apply the following knowledge:

- Data accuracy, completeness, consistency and relevance.
- The effects of missing or noisy data.
- Sources of bias in datasets, such as sampling bias or historical bias.
- How bias in data can lead to unfair or unreliable AI outcomes.
- The different ways data quality issues show up in generative systems (e.g. training data bias leading to biased generated content; data gaps leading to hallucination).
- Recognising the limitations of data-driven AI and the need for human judgement.

Students should understand that data analysis supports decision-making but does not remove uncertainty or responsibility.

## Learning aim B: Explore how data is used in the AI development lifecycle

### B1 Data within the AI development lifecycle

The essential content topics require students to apply the following knowledge:

- Defining the problem and determining data requirements.
- Collecting data from appropriate and ethical sources.
- Preparing and cleaning data to ensure quality and usability.
- Analysing data to support model training.
- Using data to train AI systems.
- Testing AI systems using appropriate datasets.
- Monitoring performance using ongoing data analysis.
- Updating and maintaining AI systems as new data becomes available.

Students should recognise that AI development is iterative and continuously informed by data.

### B2 Testing and evaluating data-driven AI systems

The essential content topics require students to apply the following knowledge:

- The purpose of separating data into training and testing datasets.
- Using data to assess system performance and reliability.
- Identifying trends, errors and anomalies in AI outputs.


 

- Understanding the implications of inaccurate or biased outputs.
- The role of evaluation in improving system design.

Students will develop awareness that testing not only measures performance, but also identifies risks.

**B3 Ethical implications of data use in AI**

The essential content topics require students to apply the following knowledge:

- Ethical data collection and informed consent.
- Privacy and data protection responsibilities.
- Bias, discrimination and fairness in data-driven AI systems.
- Transparency and explainability of automated decisions.
- Accountability for decisions influenced by AI systems.

Students will understand that ethical considerations must be addressed throughout the entire AI lifecycle.

**B4 Legal and social considerations**

The essential content topics require students to apply the following knowledge:

- Legal responsibilities related to data handling and AI use.
- The impact of AI-driven data analysis on individuals, organisations and society.
- Issues of trust and confidence in automated systems.
- The importance of governance, standards and oversight.

Students should appreciate that real-world AI systems operate within regulatory and social frameworks.

## Learning aim C: Apply data analysis techniques to support AI decisions

**C1 Data analysis in vocational contexts**

The essential content topics require students to apply the following knowledge:

- Business and finance, including forecasting and customer insight.
- Healthcare, including patient monitoring and prediction.
- Education, including learning analytics and performance tracking.
- Vocational contexts where AI-generated content is analysed and evaluated (marketing, content creation, customer service automation).
- Public services, including demand forecasting and risk analysis.

Students will understand how data-driven insights influence professional decision-making.

### C2 Applying data analysis techniques

The essential content topics require students to apply the following knowledge:

- Analyse datasets to identify meaningful patterns or trends.
- Use appropriate tools to summarise and visualise data.
- Interpret analytical results and explain their significance.
- Relate data insights to AI system behaviour and decisions.

The focus is on drawing conclusions and explaining meaning, rather than producing complex calculations.

### C3 Evaluating AI-supported insights

The essential content topics require students to apply the following knowledge:

- The effectiveness and usefulness of data-driven insights in meeting a defined purpose or problem.
- Accuracy, reliability and limitations of interpretations drawn from analysed data.
- The quality and suitability of the data used to generate AI-supported insights.
- The impact of bias, incomplete data or assumptions on AI-supported conclusions.
- Ethical implications of using AI-supported analysis, including fairness, transparency and accountability.
- Practical implications of AI-supported decisions, such as cost, efficiency, risk and user trust.
- The extent to which AI-supported insights support or constrain human decision-making.
- The role of human judgement and oversight when interpreting AI-supported outputs.
- Whether AI-based analysis is appropriate compared to alternative approaches, such as human analysis or rule-based systems.
- Situations where AI-supported insights may need to be challenged, validated or supplemented with additional evidence.

Students should demonstrate critical thinking and reflection.

### C4 Impact of data-driven AI in the workplace

The essential content topics require students to apply the following knowledge:

- How data-driven AI changes work practices and job roles.
- The increasing importance of data literacy in AI-enabled workplaces.
- Ethical responsibility when using data-driven and AI-supported systems.
- The role of human oversight in AI-supported decision-making.
- How AI-supported insights can improve efficiency, accuracy and consistency in workplace decisions.
- Potential risks of over-reliance on AI-supported analysis in professional contexts.
- The impact of AI-driven automation on workforce skills, training and employability.

- Changes to accountability and responsibility when decisions are influenced by AI systems.
- The need for transparency and explainability in AI-supported workplace decisions.
- How organisations manage bias, fairness and trust when deploying data-driven AI tools.
- The importance of organisational policies, standards and governance for responsible AI use.
- How professionals can challenge, validate or override AI-supported outputs when necessary.

## Assessment criteria

### Learning aim A: Understand data analysis and data quality in AI systems

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe how data is used within artificial intelligence systems.<br>**A.P2** Describe the relationship between data analysis and artificial intelligence.<br>**A.P3** Outline typical data analysis techniques used to support artificial intelligence systems. | **A.M1** Analyse how specific data analysis techniques and data quality factors support artificial intelligence systems. | **A.D1** Evaluate the effectiveness and limitations of data-driven artificial intelligence technologies. |

### Learning aim B: Explore how data is used in the AI development lifecycle

| Pass | Merit | Distinction |
|---|---|---|
| **B.P4** Describe the role of data analysis at key stages of the artificial intelligence development lifecycle.<br>**B.P5** Describe ethical and legal issues related to the use of data in artificial intelligence systems. [IS-C&SI] | **B.M2** Analyse how data analysis and ethical considerations are used to improve data-driven artificial intelligence systems. | **B.D2** Evaluate the use of a data-driven artificial intelligence system. |


 

### Learning aim C: Apply data analysis techniques to support AI decisions

| Pass | Merit | Distinction |
|---|---|---|
| **C.P6** Describe how data analysis supports the use of artificial intelligence in a given sector.<br>**C.P7** Interpret a given set of data to support an artificial intelligence decision. | **C.M3** Analyse how the findings support artificial intelligence decisions. | **C.D3** Evaluate the effectiveness and appropriateness of artificial intelligence decisions. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI * | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for Pearson Set Assignment (PSA)

Pearson sets the assignment for the assessment of this unit.

The PSA will take 9 hours to complete.

The PSA will be marked by centres and verified by Pearson.

The PSA will be valid for the lifetime of this qualification.

### Assessing the PSA

You will make assessment decisions for the PSA using the assessment criteria provided.

The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on PSAs. There is also further information on our website.

# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.


 

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should demonstrate evaluative understanding. They should evaluate the effectiveness and limitations of data-driven artificial intelligence technologies. They should then make reasoned judgements about how data analysis impacts reliability, fairness and trust in AI systems. Students should consider multiple factors such as bias, uncertainty and limitations of interpretation; and support their conclusions with well-reasoned arguments. Evidence at this level should demonstrate independent thinking and depth of insight beyond taught examples.

**For merit standard**, students should go beyond description and provide clear explanations of how specific data analysis techniques support artificial intelligence systems. They should explain how analysed data contributes to learning, prediction or decision-making within AI systems and support their explanations with relevant examples. Students should also analyse the importance of data quality, including accuracy, completeness and bias. They should then explain how these factors influence AI outcomes. Evidence should demonstrate a logical structure, appropriate technical language and a developing ability to link cause and effect.

**For pass standard**, students should demonstrate a basic but accurate understanding of how data is used within artificial intelligence systems. They should be able to describe the relationship between data analysis and artificial intelligence and identify different types of data commonly used in AI contexts. Students should outline basic data analysis techniques, such as summarisation, pattern identification and visualisation and describe their purpose. Evidence at this level is likely to be descriptive and may rely on straightforward examples. Assessors should confirm that terminology is used correctly and that there are no significant factual errors.

### Learning aim B

**For distinction standard**, students should evaluate the development, testing and ethical use of a data-driven AI system. They should make justified judgements about the system's effectiveness, fairness and responsibility, taking into account performance, limitations and ethical risks. Evidence should show critical analysis, balanced reasoning and clear justification of conclusions. Students may also include reasoned recommendations for improvement or risk mitigation.

**For merit standard**, students should explain how data analysis is used to test and evaluate AI systems, including how analysed data can be used to identify errors, bias and limitations. They should explain how ethical considerations influence decisions made during development and deployment, such as choices around data sourcing, transparency and accountability. Evidence should demonstrate clear connections between ethical principles and practical development decisions, supported by relevant examples.

**For pass standard**, students should be able to describe the role of data analysis within key stages of the AI development process, including data collection, preparation, training and testing. They should also describe ethical and legal issues associated with the use of data in AI systems, such as privacy, consent and bias. Evidence at this level may be descriptive and introductory, but it must accurately reflect the processes involved and show clear awareness that ethical considerations exist and are relevant.

## Learning aim C

**For distinction standard**, students should evaluate the effectiveness and appropriateness of AI-supported decisions using evidence derived from data analysis. They should make justified judgements about the quality, reliability and usefulness of the insights generated, considering factors such as data quality, bias, assumptions, limitations, ethical implications and practical impact. Students should consider the extent to which AI-supported decisions are appropriate for the intended purpose and the role of human judgement and oversight. Evidence should demonstrate critical thinking, balanced evaluation and well-justified conclusions.

**For merit standard**, students should analyse how data analysis findings support AI decisions. They should interpret patterns, trends and relationships within data and explain how these findings influence AI outputs and decision-making. Students should consider both benefits and limitations, including the effect of data quality, reliability and suitability on the resulting decisions. Evidence should demonstrate clear links between the data analysed, the insights generated and the decisions supported by AI.

**For pass standard**, students should describe how data analysis supports the use of artificial intelligence in a given sector and interpret a given set of data to support an AI decision. They should identify relevant patterns, trends or information within data and draw conclusions that relate to AI-supported outcomes. Evidence should show an understanding of how data analysis contributes to decision-making and demonstrate clear connections between the data, the interpretation and the resulting AI decision. Evidence may be straightforward and largely descriptive but should be technically accurate and appropriate to the context provided.


 

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 7: Natural Language Processing
- Unit 8: Computer Vision Basics
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 15: Big Data in AI
- Unit 16: Work Experience
- Unit 17: Creating Chatbots
- Unit 19: AI for Health
- Unit 21: AI and Society

# Unit 4: Programming for AI

**Level:** 3

**Unit type:** Pearson Set Assignment

**Guided learning hours:** 60

## Unit in brief

This unit introduces programming as the practical foundation for developing artificial intelligence systems. It establishes how code, data, tools, testing and responsible design contribute to reliable AI-related solutions.

## Unit introduction

Programming is fundamental to the creation and operation of artificial intelligence (AI) systems. Through programming, AI models are implemented, data is processed, algorithms are executed and intelligent behaviour is enabled. A sound understanding of programming concepts allows students to move beyond theoretical knowledge and engage directly with the practical development of AI solutions.

In this unit you will be introduced to the core programming concepts, techniques and environments used in artificial intelligence development. You will examine how AI systems are programmed, tested and refined. You will then apply your programming knowledge and skills to develop and test an AI solution to meet client requirements, using appropriate tools and approaches.

The unit supports progression to further study in computing, artificial intelligence and data science. It also supports progression to employment or apprenticeships in digital, technical and AI-related roles.

## Learning aims

In this unit you will:

**A** Examine the principles of programming used to develop AI systems

**B** Design an AI solution to meet client requirements

**C** Develop and test an AI solution to meet client requirements.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Explore programming concepts and technologies used in AI systems | **A1** Artificial intelligence and the role of programming<br>**A2** Programming concepts relevant to AI<br>**A3** Programming technologies and environments used in AI<br>**A4** Benefits and limitations of programming for AI | This unit is assessed through a Pearson Set Assignment. |
| **B** Design an AI solution to meet client requirements | **B1** Analysing requirements for AI solutions<br>**B2** Designing AI solutions<br>**B3** Planning, testing and refinement<br>**B4** Responsible and professional design practices | |
| **C** Develop and test an AI solution to meet requirements | **C1** Programming AI solutions<br>**C2** Applying programming skills to AI problems<br>**C3** Testing and evaluating programmed AI solutions<br>**C4** Improvement, refinement and optimisation of AI solutions<br>**C5** Review of AI solutions | |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Examine the principles of programming used to develop AI systems

#### A1 Artificial intelligence and the role of programming

The essential content topics require students to apply the following knowledge:

- Artificial intelligence refers to systems capable of performing tasks that typically require human intelligence, such as learning, recognising patterns and making decisions.
- Programming provides the rules, structure and instructions that allow AI systems to:
    - receive inputs
    - process information
    - apply logic or learning
    - and produce outputs.
- Rule-based AI, where developers explicitly code every decision using logical rules.
- Data-driven AI, where programmers write code that allows systems to learn patterns from data.
- Learning systems controlled by programmed logic, including:
    - how data is loaded
    - how learning occurs
    - how decisions are triggered
    - what constraints are applied.

The emphasis should be on how programming enables both traditional AI systems (classifiers, predictors) and modern AI applications (chatbots, content generators, AI agents).

#### A2 Programming concepts relevant to AI

The essential content topics require students to apply the following knowledge:

- Variables and data storage:
    - that variables allow programs to store and manipulate data values
    - how variables represent data being analysed, predicted or classified by AI systems
    - why poor variable management can lead to incorrect AI outputs.
- Data types:
    - common data types used in AI programming, such as numeric values, text strings and Boolean values
    - why correct data typing is essential for accurate AI processing.

- Data structures:
  - lists
  - arrays
  - dictionaries.
- Error/exception handling:
  - identifying common runtime errors and exceptions that can occur in AI-related programs
  - using error and exception handling techniques to prevent program crashes
  - providing meaningful error messages to support debugging and user understanding
  - ensuring AI systems fail safely and predictably when unexpected inputs or conditions occur
  - improving reliability, robustness and maintainability of AI programs through structured error handling.
- Reading/interpreting existing code:
  - understanding the purpose and structure of existing AI-related code
  - identifying key programming constructs such as variables, conditions, loops and functions
  - tracing program logic to determine how inputs are processed and outputs are generated
  - recognising how data is handled, transformed and used within AI programs
  - identifying potential errors, inefficiencies or limitations in existing code
  - using comments, naming conventions and documentation to support code comprehension.
- Conditional logic:
  - how conditional statements allow AI programs to behave differently depending on data values
  - how conditions support classification, filtering and decision-making
  - how incorrect or poorly designed conditions lead to bias or misclassification.
- Iteration and loops:
  - why loops are essential in AI programming to process large datasets efficiently
  - how looping constructs allow AI systems to:
    - examine each data entry
    - apply rules repeatedly
    - update learning parameters
  - the risks of inefficient looping, such as performance issues.

- Functions and modular design:
  - why AI programs are organised into functions or modules
  - how modular design improves clarity, testing and maintenance
  - how separating concerns (e.g. data preparation vs prediction logic) improves reliability.

Teaching should consistently link each concept to AI use, not generic programming theory.

**A3 Programming technologies and environments used in AI**

The essential content topics require students to apply the following Ap:

- AI programming typically uses high-level languages designed for readability and abstraction.
- Development environments support:
  - writing code
  - running experiments
  - visualising outputs
  - documenting results.
- The concept of libraries and frameworks that provide pre-written AI functionality.
- Why professional developers rely on these tools to increase efficiency and reliability.
- How pre-trained models and Application Programming Interfaces (APIs) allow programmers to integrate AI features without building models from scratch.
- The difference between writing all logic manually and configuring existing AI components.
- That responsible use requires understanding the limitations of tools, not blind adoption.

The emphasis should be on how developers use APIs to access large language models; how prompt design and configuration are forms of AI programming; how AI agents are structured through programming logic.

**A4 Benefits and limitations of programming for AI**

The essential content topics require students to apply the following knowledge:

- Flexibility in designing AI systems.
- Scalability to handle large volumes of data.
- Automation of repetitive tasks.
- Reusability of code for different AI projects.
- Complexity of debugging AI behaviour.
- Difficulty understanding decisions made by complex systems.
- Risks arising from poorly structured or undocumented code.
- Dependence on programmer choices and assumptions.

Students should reflect on the idea that faulty AI behaviour is often a programming issue, not an AI issue.

## Learning aim B: Design an AI solution to meet client requirements

### B1 Analysing requirements for AI solutions

The essential content topics require students to apply the following knowledge:

- Interpreting client or user requirements.
- Application of the AI development lifecycle, including:
  - an assessment of the requirements for an identified problem
  - design specification, e.g. scope, inputs, processing and outputs, success criteria
  - constraints, including technical, operational, ethical and financial
  - translating requirements into programmable tasks
  - determining data requirements
  - develop code
  - implementation
  - test, e.g. closed box and open box testing, refinement, optimisation
  - maintenance, e.g. corrective, adaptive and increased functionality.

### B2 Designing AI solutions

The essential content topics require students to apply the following knowledge:

- Producing solution designs, to include intended users, full summary of the problem to be solved, constraints, benefits, nature of interactivity, complexity of problem, client requirements.
- Selecting appropriate programming constructs.
- Selecting appropriate AI tools, APIs or platforms.
- Designing:
  - program structure
  - processing logic
  - user interactions
  - outputs.
- Features of the AI solution:
  - description of main program tasks, input and output formats
  - diagrammatic illustrations
  - algorithms and processing stages
  - data structures
  - data storage
  - control structures
  - data validation
  - error handling and reporting.

- Creating:
  - pseudocode
  - flowcharts
  - wireframes
  - decision trees.
- Planning modular program structures.
- Considering maintainability and scalability.
- Feedback from others to help refine alternative solution design ideas and make decisions.

**B3 Planning, testing and refinement**

The essential content topics require students to apply the following knowledge:

- Designing test plans.
- Identifying:
  - normal test data
  - boundary test data
  - invalid test data.
- Defining expected outcomes.
- Planning debugging approaches.
- Identifying potential risks and limitations.
- Planning iterative improvement activities.

**B4 Responsible and professional design practices**

The essential content topics require students to apply the following knowledge:

- Designing solutions which:
  - promote fairness
  - reduce bias
  - protect privacy.
- Considering explainability and transparency.
- Applying professional documentation standards.
- Producing clear design documentation.
- Considering legal and regulatory requirements.
- Justifying design decisions.

## Learning aim C: Develop and test an AI solution to meet requirements [SP-PS]

### C1 Programming AI solutions

The essential content topics require students to apply the following knowledge:

- Implement AI-related logic using programming constructs.
- Work with datasets or simulated inputs.
- Observe how changes in code affect outputs.
- How structure influences behaviour.
- The importance of clarity and readability.
- A rule-based decision system using programming constructs.
- A simple chatbot or text classifier using an API or educational AI platform.
- A data processing script that prepares and analyses data for an AI task.
- Configuration of an AI agent or tool for a specific vocational purpose.

### C2 Applying programming skills to AI problems

The essential content topics require students to apply the following knowledge:

- Selecting appropriate programming constructs to meet the requirements of specific AI tasks.
- Adapting existing components, libraries or code segments to suit different AI problems.
- Combining logic, data handling and outputs to create functional AI-related solutions.

### C3 Testing and evaluating AI solutions

The essential content topics require students to apply the following knowledge:

- Checking whether outputs match expected results.
- Identifying limitations in program logic or data used.
- Recognising risks associated with incorrect or misleading outputs.

### C4 Improvement, refinement and optimisation of AI solutions

The methods and processes used to improve and optimise AI solutions.

- Methods of improving, refining and optimising, e.g.:
  - annotated code to allow effective repair/debugging of the program and maintainability
  - review – quality of the AI solution in terms of reliability, usability, efficiency/performance, maintainability
  - obtain feedback from users
  - making use of the outcomes of testing and feedback
  - documenting changes to the AI solution.

### C5 Review of AI solutions

The essential content topics require students to apply the following knowledge:

- The concepts and evaluation of software solutions.
- Evaluation of AI solutions, including:
  - suitability for intended users and purpose
  - ease of use
  - quality of the AI solution, e.g. reliability, usability, efficiency/performance, maintainability
  - constraints of the AI development tools
  - other constraints, e.g. time, programmer knowledge
  - strengths and weaknesses of the AI solutions
  - improvements that can be made
  - optimising AI solutions, e.g. improving robustness, improving efficiency of the code, adding additional functionality.

## Assessment criteria

### Learning aim A: Examine the principles of programming used to develop AI systems

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe how programming underpins artificial intelligence systems.<br>**A.P2** Describe core programming concepts and development technologies commonly used in artificial intelligence systems. | **A.M1** Analyse how specific programming concepts support the functionality of artificial intelligence systems. | **A.D1** Evaluate the effectiveness of programming approaches used in artificial intelligence systems. |

### Learning aim B: Design an AI solution to meet client requirements

### Learning aim C: Develop and test an AI solution to meet client requirements

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Produce a design for an AI solution to meet client requirements.<br>**B.P4** Review the design with others to identify and inform improvements to the proposed AI solution. | **B.M2** Justify design decisions, showing how the design will result in an effective AI solution. | **BC.D2** Evaluate the design and optimised AI solution against client requirements. |
| **C.P5** Produce an AI solution that meets client requirements.<br>**C.P6** Review the extent to which the AI solution meets client requirements. | **C.M3** Optimise the AI solution to meet client requirements. | |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS * |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for Pearson Set Assignment (PSA)

Pearson sets the assignment for the assessment of this unit.

The PSA will take 9 hours to complete.

The PSA will be marked by centres and verified by Pearson.

The PSA will be valid for the lifetime of this qualification.

### Assessing the PSA

You will make assessment decisions for the PSA using the assessment criteria provided.

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# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- AI programming approaches:
  - API integration
  - prompt engineering.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should demonstrate evaluative understanding. They should critically evaluate programming approaches used in artificial intelligence systems and make reasoned judgements about how programming choices influence system performance, reliability and trustworthiness. Students should consider factors such as design decisions, implementation quality and limitations of programming-based AI solutions. They should then justify their conclusions using relevant examples or scenarios. Evidence should demonstrate insight, independence and depth beyond taught examples.

**For merit standard**, students should go beyond description and provide clear explanations of how specific programming concepts support the functionality of AI systems. They should explain how constructs such as variables, conditions, loops or functions are applied within AI programming contexts. They should also explain how development tools or libraries contribute to system effectiveness. Students should also analyse the benefits and limitations of programming for AI development, showing understanding of technical and practical trade-offs such as flexibility, complexity and maintainability. Evidence should be structured logically and demonstrate an emerging ability to link cause and effect.

**For pass standard**, students should demonstrate a basic but accurate understanding of the role of programming in artificial intelligence. They should be able to describe how programming interacts with data and algorithms to enable AI systems to function and identify core programming concepts and technologies used in AI development. Evidence at this level is likely to be descriptive and factual, focusing on what concepts are and how they are used. Assessors should ensure that students use appropriate terminology correctly and that explanations are free from significant factual errors.

### Learning aims B and C

**For distinction standard**, students should demonstrate a comprehensive and critical approach to the design, development, testing and evaluation of an AI solution. They should produce a well-justified design that clearly addresses client requirements and show how technical and practical considerations have informed design decisions throughout the development process. The completed AI solution should function effectively, demonstrate evidence of optimisation and refinement and be evaluated against the original client requirements using appropriate judgement criteria. Students should make well-reasoned judgements about the effectiveness of both the design and the final solution, supported by evidence from development, testing, user feedback and review activities. Evidence should demonstrate an ability to identify strengths, limitations and opportunities for improvement, together with justified conclusions about the overall suitability of the solution.


 

**For merit standard**, students should demonstrate a clear and logical approach to designing, developing and improving an AI solution. They should justify design decisions by explaining how selected programming approaches, tools, structures and features will contribute to the effectiveness of the proposed solution. During development they should produce a functioning AI solution and use testing outcomes, feedback and review activities to identify and implement improvements. Students should show how optimisation activities have enhanced the performance, usability, reliability or maintainability of the solution. Evidence should demonstrate a clear relationship between client requirements, design decisions, development activities and the final solution.

**For pass standard**, students should produce a design for an AI solution that addresses the stated client requirements. The design should include appropriate information about the intended purpose, users, processing requirements, inputs, outputs, data requirements and proposed functionality. Students should review the design with others and use feedback to identify possible improvements before implementation. They should then develop an AI solution that reflects the design and meets the essential client requirements. Students should review the completed solution, considering how well it performs against the original requirements and identifying any limitations or areas for future improvement. Evidence should demonstrate a logical progression from design to implementation and review.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 7: Natural Language Processing
- Unit 8: Computer Vision Basics
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 13: AI Programming Techniques
- Unit 15: Big Data in AI
- Unit 16: Work Experience
- Unit 17: Creating Chatbots
- Unit 21: AI and Society

# Unit 5: Ethics in AI

**Level:** 3

**Unit type:** Pearson Set Assignment

**Guided learning hours:** 60

## Unit in brief

This unit explores the societal, legal and governance implications of artificial intelligence, examining how AI influences individuals, communities, organisations and wider society.

## Unit introduction

Artificial intelligence has moved beyond specialist technical environments and is now embedded within many aspects of everyday life. As organisations increasingly rely on AI-driven technologies, significant questions emerge regarding the impact of these systems on individuals, communities and society as a whole. The growth of artificial intelligence creates opportunities to improve productivity, increase accessibility, support innovation and enhance public services. However, it also raises important societal and legal considerations relating to trust, accountability, employment, digital inclusion, privacy, governance and the future relationship between people and technology.

In this unit, you will investigate the wider societal implications of artificial intelligence and explore how AI influences human experiences, communities and cultures. You will examine legal and regulatory approaches that seek to balance innovation with public protection and consider the responsibilities of different stakeholders involved in the development, deployment and oversight of AI technologies.

The unit aims to develop ethical awareness, critical thinking and professional responsibility, supporting progression into further study, employment or apprenticeships in digital, technical and data-driven roles.

## Learning aims

In this unit you will:

**A** Examine the impact of AI on society and human experiences

**B** Examine legal, regulatory and governance approaches relating to AI

**C** Explore future societal challenges and opportunities created by AI.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Examine the impact of AI on society and human experiences | **A1** Artificial intelligence in everyday life<br>**A2** Artificial intelligence and employment<br>**A3** Artificial intelligence and communities<br>**A4** Artificial intelligence, creativity and culture | This unit is assessed through a Pearson Set Assignment. |
| **B** Examine legal, regulatory and governance approaches relating to AI | **B1** Legal considerations<br>**B2** Governance of artificial intelligence<br>**B3** Regulation of artificial intelligence<br>**B4** Responsibility of stakeholders | |
| **C** Explore future societal challenges and opportunities created by AI | **C1** Public trust and confidence<br>**C2** Emerging challenges<br>**C3** Opportunities for society<br>**C4** Shaping the future of artificial intelligence | |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Examine the impact of AI on society and human experiences

#### A1 Artificial intelligence in everyday life

The essential content topics require students to apply the following knowledge:

The growing presence of artificial intelligence in society:

- AI-enabled consumer products and services (e.g. smart speakers, online shopping platforms, streaming services, virtual assistants, smart home devices and personalised online services).
- Recommendation systems used to suggest products, films, music, social media content and news articles (e.g. Netflix, Spotify, YouTube, Amazon).
- AI-powered customer service tools (e.g. banking chatbots, airline virtual assistants, online retail support assistants).
- Navigation, translation and accessibility tools supported by AI (e.g. Google Maps, Google Translate, live captions, speech-to-text software).

Changing interactions between humans and technology:

- Human reliance on AI-supported systems (e.g. route planning applications, recommendation engines, smart assistants).
- Trust in automated recommendations and decisions (e.g. credit scoring systems, healthcare triage systems, online purchasing recommendations).
- Human judgement compared with AI-supported decision making (e.g. recruitment screening tools, predictive policing systems, fraud detection software).
- Benefits and limitations of convenience through automation (e.g. automated scheduling, automated customer support, personalised learning systems).

#### A2 Artificial intelligence and employment

The essential content topics require students to apply the following knowledge:

Changes to employment patterns:

- Automation of routine and repetitive tasks (e.g. automated stock control, invoice processing, data entry).
- Human-AI collaboration within workplaces (e.g. AI-assisted design, AI coding assistants, AI-supported marketing campaigns).
- Emerging career opportunities related to AI (e.g. prompt engineer, AI governance officer, AI auditor).
- Transformation of existing occupational roles (e.g. radiologists using diagnostic AI tools, teachers using adaptive learning platforms).

Implications for workers:

- Reskilling and upskilling (e.g. training in AI literacy, data analysis and AI-assisted workflows).
- Changes in required digital skills (e.g. prompt writing, validation of AI outputs, AI oversight).
- Workforce adaptability and lifelong learning (e.g. continuous professional development in emerging technologies).
- Workforce wellbeing and job satisfaction (e.g. reducing repetitive administrative tasks while managing concerns about job displacement).

Economic impacts:

- Productivity improvements through automation and decision support (e.g. automated administration, supply chain optimisation, customer analytics).
- Changes in labour demand across industries (e.g. increasing demand for digital skills, declining demand for some manual processes).
- Growth of AI-related industries and services (e.g. AI software development, consulting, cloud-based AI services).
- Regional differences in technology adoption and employment opportunities (e.g. technology hubs, rural and urban disparities).

**A3 Artificial intelligence and communities**

The essential content topics require students to apply the following knowledge:

Social inclusion and exclusion:

- Unequal access to AI-enabled technologies (e.g. limited internet access, lack of suitable devices, affordability barriers).
- Variations in digital skills and confidence (e.g. older adults, disadvantaged communities, digitally excluded groups).
- Accessibility benefits provided by AI technologies (e.g. screen readers, speech recognition software, real-time translation tools).
- Potential barriers created by technology dependence (e.g. online-only services, automated support systems).

AI in public services:

- Healthcare applications improving service delivery (e.g. patient triage systems, diagnostic support tools, healthcare scheduling systems).
- Educational applications supporting teaching and learning (e.g. adaptive learning platforms, personalised tutoring systems).
- Social care applications assisting service users and providers (e.g. monitoring technologies, scheduling systems).
- Transport applications supporting efficiency and safety (e.g. traffic management systems, route optimisation tools).
- Government services supported by AI technologies (e.g. online information services, automated enquiry handling systems).

Community impacts:

- Improved access to public information and services (e.g. virtual assistants, multilingual service provision, online support channels).
- Increased opportunities for civic participation and engagement (e.g. consultation platforms, citizen feedback systems).
- Community resilience supported by data-driven technologies (e.g. emergency response planning, environmental monitoring systems).
- Changes in social interaction and communication (e.g. AI-generated content, social media algorithms, online communities).

**A4 Artificial intelligence, creativity and culture**

The essential content topics require students to apply the following knowledge:

AI and creative expression:

- AI-assisted content generation (e.g. image generation tools, text generation tools, music creation platforms).
- Human-AI collaboration within creative industries (e.g. graphic design, filmmaking, advertising, journalism).
- Opportunities created for creative professionals (e.g. rapid prototyping, content enhancement, idea generation).
- Challenges relating to originality, authenticity and authorship (e.g. AI-generated artwork, AI-written articles, synthetic media).

Cultural considerations:

- Representation of cultures within AI-generated content (e.g. images, language models, media recommendations).
- Preservation and promotion of languages and heritage (e.g. language translation tools, digital archiving projects).
- Cultural diversity within digital environments (e.g. content moderation practices, recommendation systems).
- Influence of AI on global communication and cultural exchange (e.g. multilingual communication tools, international content distribution).

Public perceptions of AI:

- Media portrayals of AI technologies (e.g. films, documentaries, news reporting, social media discussions).
- Public expectations regarding AI capabilities (e.g. beliefs about automation, intelligence and productivity).
- Public concerns relating to AI adoption (e.g. job displacement, privacy concerns, misinformation).
- Influence of popular culture on understanding AI (e.g. science fiction films, television programmes, online discussions).

## Learning aim B: Examine legal, regulatory and governance approaches relating to AI [SP-CT]

### B1 Legal considerations

The essential content topics require students to apply the following knowledge:

Data protection and privacy:

- Collection and processing of personal data (e.g. online purchasing histories, location data, browsing behaviour).
- Consent and lawful use of information (e.g. cookie permissions, healthcare data sharing permissions).
- Sensitive personal information (e.g. medical records, biometric data, financial information).
- Rights of individuals (e.g. access requests, correction of personal information, deletion requests).

Intellectual property:

- Ownership of AI-generated content (e.g. AI-generated artwork, music and written content).
- Copyright implications (e.g. AI models trained on copyrighted books, images and media).
- Licensing arrangements (e.g. commercial AI image-generation tools, open-source AI models).
- Attribution of creative works (e.g. identifying the contribution of human creators and AI tools).

Liability and accountability:

- Responsibility for decisions influenced by AI systems (e.g. automated recruitment screening, loan eligibility assessments, fraud detection systems).
- Organisational accountability for AI outcomes (e.g. incorrect healthcare recommendations, inaccurate automated customer decisions).
- Consumer protection considerations (e.g. misleading AI-generated information, incorrect product recommendations).
- Product liability issues (e.g. autonomous vehicle incidents, failures of AI-enabled consumer devices).

### B2 Governance of artificial intelligence

The essential content topics require students to apply the following knowledge:

Organisational governance:

- Internal policies and procedures governing AI use (e.g. acceptable-use policies, responsible AI policies, data governance frameworks).

- Ethical standards and codes of conduct (e.g. industry ethical principles, organisational AI standards, professional body guidance).
- Decision-making structures for AI adoption (e.g. executive oversight groups, project steering committees, governance boards).
- Governance responsibilities across departments (e.g. legal teams, compliance officers, IT managers, senior leaders).

Oversight and assurance:

- Monitoring AI deployment and performance (e.g. algorithm review processes, compliance monitoring, governance reporting).
- Reporting concerns and incidents (e.g. whistleblowing mechanisms, internal incident reporting processes).
- Internal audits and review processes (e.g. annual technology audits, compliance reviews, governance checks).
- Independent scrutiny and assurance (e.g. external audits, regulatory inspections, third-party reviews).

Risk management:

- Identification of potential harms (e.g. exclusion of vulnerable groups, misinformation, inappropriate decisions).
- Assessment of social and organisational impacts (e.g. effects on employees, customers, citizens and communities).
- Risk mitigation strategies (e.g. human oversight, staff training, governance controls).
- Ongoing monitoring and evaluation (e.g. periodic reviews, impact assessments, performance monitoring).

**B3 Regulation of artificial intelligence**

The essential content topics require students to apply the following knowledge:

Purposes of regulation:

- Protecting individuals from harm caused by AI systems (e.g. discriminatory outcomes, privacy breaches, financial losses).
- Supporting innovation while maintaining safeguards (e.g. regulatory sandboxes, innovation programmes).
- Promoting trust and confidence in AI adoption (e.g. transparency obligations, reporting requirements).
- Establishing standards of behaviour for AI developers and organisations (e.g. compliance requirements, accountability frameworks).

National and international aproaches:

- Government strategies for AI development and use (e.g. national AI strategies, digital transformation programmes).
- Regulatory frameworks for emerging technologies (e.g. sector-specific regulation, public sector guidance).
- Public sector adoption and oversight of AI (e.g. AI in healthcare, education and government services).
- International cooperation on AI governance (e.g. multinational agreements, international working groups).
- Global governance challenges (e.g. differing legal systems, uneven technological development).
- Cross-border implications of AI deployment (e.g. multinational technology providers, international data transfers).
- Development of global standards and best practices (e.g. international standards bodies, professional guidelines).

**B4 Responsibilities of stakeholders**

The essential content topics require students to apply the following knowledge:

Governments and regulators:

- Creating policies and legislation governing AI use (e.g. data protection legislation, consumer protection frameworks).
- Protecting public interests (e.g. safeguarding citizens, promoting fairness and transparency).
- Supporting economic growth and innovation (e.g. research funding, innovation grants, infrastructure investment).
- Developing workforce skills and AI literacy (e.g. national education initiatives, digital skills programmes).

Technology organisations:

- Designing and deploying AI responsibly (e.g. ethical review processes, governance policies).
- Providing transparency to users (e.g. explaining when AI is used, publishing transparency statements).
- Protecting consumers and communities (e.g. safeguarding measures, complaint procedures).
- Monitoring and improving AI systems (e.g. reviews of system performance, governance reporting).


 

Citizens and consumers:

- Understanding how AI is used in everyday life (e.g. social media algorithms, digital assistants, online services).
- Developing digital literacy and critical-thinking skills (e.g. evaluating online information, identifying AI-generated content).
- Participating in public discussions about AI (e.g. consultations, surveys, public forums).
- Using AI tools responsibly (e.g. verifying outputs, protecting personal data, respecting intellectual property).

## Learning aim C: Explore future societal challenges and opportunities created by AI [SP-CT]

### C1 Public trust and confidence

The essential content topics require students to apply the following knowledge:

Factors influencing trust:

- Reliability and consistency of AI systems (e.g. healthcare diagnostic tools, navigation systems, financial services applications).
- Transparency in AI-supported decisions (e.g. explanations provided for loan applications or insurance decisions).
- Perceived fairness and accountability (e.g. equal treatment of different groups within automated systems).
- Availability of human oversight and intervention (e.g. human review of recruitment decisions, healthcare recommendations).

Factors reducing trust:

- System failures and inaccurate outputs (e.g. incorrect recommendations, AI hallucinations).
- Misinformation and manipulated content (e.g. deepfakes, synthetic media, fake news)
- Lack of transparency (e.g. unexplained automated decisions).
- Insufficient accountability mechanisms (e.g. uncertainty about who is responsible for outcomes).

Maintaining trust:

- Open communication about AI capabilities and limitations (e.g. transparency notices, user guidance).
- Independent oversight and governance (e.g. external reviews, regulatory scrutiny).
- User education and awareness programmes (e.g. AI literacy campaigns, public awareness initiatives).
- Effective organisational governance (e.g. ethical review boards).

### C2 Emerging societal challenges

The essential content topics require students to apply the following knowledge:

Consideration of technological power:

- Influence of large technology organisations on AI development (e.g. multinational technology companies controlling major AI models).
- Access to computing resources and infrastructure (e.g. advanced data centres, cloud computing platforms).
- Market concentration and competition issues (e.g. dominance of major AI providers).
- Global economic and political influence (e.g. technological leadership and dependence).

Digital inequalities:

- Unequal access to AI-enabled technologies (e.g. differences between rural and urban communities).
- Variations in digital skills and education (e.g. access to AI training and digital literacy programmes).
- Economic barriers to adoption (e.g. cost of devices, connectivity and software).
- International disparities in technological development (e.g. developing and developed economies).

Societal dependence on AI:

- Reliance on automated systems and services (e.g. navigation systems, online banking, healthcare systems).
- Maintaining resilience during technology failures (e.g. service outages, cybersecurity incidents).
- Preserving human oversight and professional judgement (e.g. healthcare, education and public services).
- Balancing efficiency with human autonomy (e.g. automated versus human-led decisions).

### C3 Opportunities for society

The essential content topics require students to apply the following knowledge:

Benefits for individuals:

- Personalised services and experiences (e.g. adaptive learning platforms, personalised healthcare recommendations).
- Improved accessibility (e.g. speech recognition software, real-time translation, assistive technologies).
- Enhanced wellbeing and quality of life (e.g. health-monitoring applications, smart home systems).
- Increased access to information and services (e.g. digital assistants, online support services).

Benefits for organisations:

- Improved productivity and efficiency (e.g. automated administration, workflow optimisation).
- Better decision support (e.g. predictive analytics, business intelligence tools).
- Innovation opportunities (e.g. development of new products and services).
- Enhanced customer experiences (e.g. personalised recommendations, virtual assistants).

Benefits for society:

- Scientific discovery and research (e.g. medical research, climate modelling, drug development).
- Environmental monitoring and sustainability (e.g. energy optimisation, environmental data analysis).
- Improved public services (e.g. transportation planning, emergency response systems).
- Greater global connectivity and collaboration (e.g. translation technologies, international research projects).

**C4 Shaping the future of artificial intelligence**

The essential content topics require students to apply the following knowledge:

Future governance approaches:

- Adaptive regulation responding to technological change (e.g. regularly updated guidance, flexible compliance frameworks).
- International cooperation and coordination (e.g. global agreements, international standards).
- Responsible innovation practices (e.g. ethical innovation frameworks, governance-by-design approaches).
- Long-term planning and foresight activities (e.g. future scenario planning, technology horizon scanning).

Public engagement and participation:

- Public consultations regarding AI policy (e.g. government consultations, stakeholder surveys).
- Citizen panels and community discussions (e.g. public forums, participatory decision-making).
- Stakeholder engagement activities (e.g. industry groups, educational institutions, consumer organisations).
- Educational initiatives supporting AI literacy (e.g. awareness campaigns.

Balancing opportunities and risks:

- Innovation versus regulation (e.g. encouraging technological advancement while maintaining safeguards).
- Economic growth versus public protection (e.g. supporting investment while protecting consumers).
- Automation versus employment (e.g. improving productivity while supporting workforce development).
- Individual rights versus societal benefits (e.g. use of AI in healthcare, public safety and public services).

## Assessment criteria

### Learning aim A: Examine the impact of AI on society and human experiences

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Explain how artificial intelligence influences individuals and their interactions with technology.<br>**A.P2** Explain the impact of artificial intelligence on employment, communities and culture. | **A.M1** Analyse the impact of artificial intelligence on different groups within society. | **A.D1** Evaluate the significance of artificial intelligence on human experiences and wider society. |

### Learning aim B: Examine legal, regulatory and governance approaches relating to AI

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Explain legal considerations associated with the use of artificial intelligence.<br>**B.P4** Explain governance approaches and stakeholder responsibilities relating to artificial intelligence. | **B.M2** Analyse how legal, regulatory and governance approaches influence the use of artificial intelligence. | **B.D2** Evaluate the effectiveness of legal, regulatory and governance approaches in addressing societal challenges associated with artificial intelligence. |

## Learning aim C: Explore future societal challenges and opportunities created by AI

| Pass | Merit | Distinction |
|---|---|---|
| **C.P5** Explain the future challenges associated with the increasing use of artificial intelligence.<br>**C.P6** Explain the future opportunities associated with the increasing use of artificial intelligence. | **C.M3** Analyse the potential future challenges and opportunities created by artificial intelligence for individuals, organisations and society. | **C.D3** Evaluate how artificial intelligence can be governed and managed to maximise benefits whilst minimising risks. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
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- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

#### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students will evaluate the extent to which AI influences human experiences and societal change, considering both opportunities and challenges. Students will make supported judgements, weigh contrasting viewpoints and reach justified conclusions based on evidence. Evidence is likely to include balanced evaluations supported by a range of examples and clear justification of conclusions.

**For merit standard**, students will analyse how AI affects different groups within society and explore both positive and negative consequences. Students will identify relationships, connections and differing perspectives, considering how impacts may vary depending on context, stakeholder needs or levels of access to technology. Evidence is likely to include analysis of how AI affects individuals, organisations and communities, supported by relevant examples and reasoned discussion.

**For pass standard**, students will explain ways in which AI influences everyday interactions with technology and describe its impact on areas such as employment, communities, culture and creative activities. Students will make appropriate use of examples to illustrate their understanding but may focus primarily on straightforward explanations and descriptions. Evidence is likely to include descriptions of AI applications used in everyday life and explanations of their impact on individuals, workplaces, communities and cultural activities.

### Learning aim B

**For distinction standard**, students will evaluate strengths, limitations and challenges associated with existing approaches and make justified judgements about their effectiveness in addressing societal issues associated with AI. Students should consider alternative viewpoints and support conclusions with evidence. Evidence is likely to include well-supported evaluations of governance and regulatory approaches, together with reasoned conclusions and recommendations.

**For merit standard**, students will examine the relationships between legislation, regulation, organisational governance and stakeholder decision-making. Students will analyse how these approaches support the adoption and oversight of AI whilst addressing potential risks and societal concerns. Evidence is likely to include comparative analysis of different governance and regulatory approaches together with consideration of their impact on organisations, individuals and society.

**For pass standard**, students will explain legal considerations associated with the use of AI, including issues relating to privacy, data protection, intellectual property and accountability. Students will also explain the responsibilities of different stakeholders and describe governance approaches used by organisations and governments. Evidence is likely to include explanations of legal frameworks, governance arrangements and stakeholder responsibilities supported by relevant examples.

## Learning aim C

**For distinction standard**, students will evaluate approaches intended to maximise societal benefits whilst minimising risks and consider the role of governments, organisations, communities and citizens in shaping the future use of AI. Students will make justified judgements and propose well-reasoned conclusions based on their analysis.

Evidence is likely to include comprehensive evaluation of future governance approaches, supported by examples, stakeholder perspectives and clear recommendations.

**For merit standard**, students will analyse both opportunities and challenges arising from the increased adoption of AI, considering implications for individuals, organisations and wider society. Students will recognise that impacts may vary between stakeholders and contexts. Evidence is likely to include balanced analysis supported by examples, stakeholder perspectives and reasoned discussion.

**For pass standard**, students will examine challenges such as public trust, digital inequalities, technological dependence and concentration of technological power, together with opportunities including improved services, innovation, accessibility and scientific advancement. Evidence is likely to include explanations of future challenges and opportunities supported by appropriate examples.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 9: AI Algorithms
- Unit 11: AI in Business
- Unit 16: Work Experience
- Unit 19: AI for Health
- Unit 21: AI and Society

# Unit 6: Testing and Evaluation of AI Models

**Level:** 3

**Unit type:** Pearson Set Assignment

**Guided learning hours:** 60

## Unit in brief

This unit introduces the principles and practices used to test and evaluate artificial intelligence models for performance, reliability and suitability for real-world use.

## Unit introduction

Before artificial intelligence systems can be trusted in real-world settings, it is important to understand the factors that influence their reliability and trustworthiness. Students will explore how AI systems support decision-making, why their outputs may sometimes be uncertain or inaccurate and the risks that can arise when AI systems are used without appropriate oversight. They will also consider the responsibilities of organisations and individuals when deploying AI systems and why trust, accountability and professional judgement are essential for the responsible use of artificial intelligence.

In this unit, you will be introduced to the principles and practices of testing and evaluating artificial intelligence models. You will explore how AI systems are assessed for performance, reliability, bias, limitations and suitability for real-world use. You will examine how testing is integrated into responsible AI development and consider the ethical and professional implications of deploying inadequately evaluated systems. Finally, you will apply evaluation techniques to practical and vocational contexts, interpreting results and making justified judgements about AI model effectiveness.

The unit develops students' analytical thinking, judgement and professional awareness, supporting progression to further study or employment in artificial intelligence, data science, digital technologies and related technical roles.

## Learning aims

In this unit you will:

**A** Examine the factors that affect the reliability and trustworthiness of AI systems

**B** Explore testing and evaluation methods used on AI systems

**C** Apply testing and evaluation techniques on an AI model.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Examine the factors that affect the reliability and trustworthiness of AI systems | **A1** Artificial intelligence systems and models<br>**A2** Data, learning and AI outputs<br>**A3** Performance and limitations of AI systems<br>**A4** Why testing and evaluation are essential in AI | This unit is assessed through a Pearson Set Assignment. |
| **B** Explore testing and evaluation methods used on AI systems | **B1** Testing within the AI development lifecycle<br>**B2** Evaluation metrics and performance measures<br>**B3** Identifying bias, error and limitations<br>**B4** Responsible use and ethical implications of evaluation | |
| **C** Apply testing and evaluation techniques on an AI model | **C1** Testing AI systems in practical contexts<br>**C2** Interpreting and communicating evaluation results<br>**C3** Evaluating suitability of AI models<br>**C4** Vocational and professional relevance of evaluation | |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Examine the factors that affect the reliability and trustworthiness of AI systems

#### A1 The role of AI in decision-making

The essential content topics require students to apply the following knowledge:

- AI as a tool for prediction, classification, recommendation and decision support.
- Human dependence on AI outputs.
- AI use in business, healthcare, recruitment, finance and security.
- Consequences of incorrect AI decisions.
- Examples of high-profile AI successes and failures.

#### A2 Reliability and trust in AI systems

The essential content topics require students to apply the following knowledge:

- Reliability, consistency and dependability.
- Accuracy versus trustworthiness.
- Sources of uncertainty in AI outputs.
- Confidence, probability and risk.
- Limitations of AI-generated outputs.

#### A3 Risks and harms associated with AI

The essential content topics require students to apply the following knowledge:

- False positives and false negatives.
- Bias and unfair outcomes.
- Misinformation and hallucinations in generative AI.
- Financial, legal and reputational consequences.
- Safety and wellbeing considerations.

#### A4 Accountability and responsible deployment

The essential content topics require students to apply the following knowledge:

- Organisational responsibility for AI outcomes.
- Human oversight and decision-making.
- Transparency and explainability.
- Governance and regulatory expectations.
- Why testing and evaluation support trust and accountability.

## Learning aim B: Explore testing and evaluation methods used on AI systems

### B1 Testing within the AI development lifecycle

The essential content topics require students to apply the following knowledge:

- That testing occurs during model development, not just at the end.
- The difference between:
  - training
  - validation
  - testing.
- How evaluation results guide model refinement.
- Iterative improvement through repeated testing.
- The dangers of skipping evaluation stages.
- The role of evaluation in deciding readiness for deployment.

Students should understand that deployment without thorough testing is professionally irresponsible.

### B2 Evaluation metrics and performance measures

The essential content topics require students to apply the following knowledge:

- Why performance metrics exist.
- That no single metric tells the whole story.
- That different problems require different evaluation priorities.
- Accuracy (meaning the overall correctness of predictions) and limitations in accuracy when data is imbalanced.
- Precision (meaning how many positive predictions were correct) and recall (meaning how many actual positives were found); and the trade-off between precision and recall.
- F1 score as a balanced measure combining precision and recall.
- Confusion matrix as a visual tool for understanding how a classification model performs across different categories.
- Reliability and consistency of outputs.
- How generative AI systems are evaluated (human evaluation of quality, ground truth checks, benchmark comparisons) alongside traditional metrics.
- When numerical performance might hide practical weaknesses.

Students should understand that evaluation is about judgement, not just numbers.


 

### B3 Identifying bias, error and model limitations

The essential content topics require students to apply the following knowledge:

- How bias can be revealed through uneven performance.
- How bias in generative AI can produce stereotyped or harmful content, not just unfair classifications.
- How certain groups or cases may be consistently mis-handled.
- The importance of analysing failures, not just successes.
- The ethical implications of biased or unreliable models.
- Why evaluation must include qualitative reasoning alongside quantitative data.
- The risk of assuming fairness without evidence.

Students should understand that responsible AI depends on honest recognition of limitations.

### B4 Responsible use and ethical implications of evaluation

The essential content topics require students to apply the following knowledge:

- That organisations and developers are responsible for AI outcomes.
- That evaluation results must be reported transparently.
- That ignoring evaluation evidence increases ethical and legal risk.
- Human oversight and decision-making responsibility.
- When AI systems should not be used despite acceptable performance.
- The relationship between evaluation, governance and trust.

Students should recognise evaluation as a safeguard against harm.

## **Learning aim C: Apply testing and evaluation techniques on an AI model** [SP-PS]

### C1 Testing AI systems in practical contexts

The essential content topics require students to apply the following knowledge:

- Business and financial forecasting.
- Healthcare decision-support systems.
- Evaluating a generative AI tool used for customer service, content creation or report drafting as a vocational context.
- Recruitment and screening tools.
- Risk management and security applications.
- That acceptable performance varies by context.
- That consequences of error differ between sectors.
- That higher-risk contexts require stricter evaluation standards.

### C2 Interpreting and communicating evaluation results

The essential content topics require students to apply the following knowledge:

- How to interpret test results meaningfully rather than relying on single performance figures.
- How to identify strengths, weaknesses, limitations and potential risks from evaluation evidence.
- How different metrics may highlight different aspects of AI system performance.
- The importance of contextualising results based on the intended use of the AI system.
- How to explain evaluation findings clearly to non-technical stakeholders.
- The need for clear, honest and responsible communication of results.
- Avoiding misleading presentation or over-statement of AI performance.
- Using evaluation evidence to support justified professional decisions about AI use.

This reflects real workplace expectations.

### C3 Evaluating suitability of AI models

The essential content topics require students to apply the following knowledge:

- Whether an AI model is fit for its intended purpose and vocational context.
- Whether the model meets acceptable performance standards for real-world use.
- Whether further testing, refinement or improvement is required before deployment.
- Whether ethical, legal or practical risks outweigh potential benefits.
- Evidence-based judgement using testing and evaluation results.
- The importance of context-specific risk, where consequences of error vary by sector.
- Recognising situations where an AI system should not be deployed.
- Responsible decision-making that prioritises safety, fairness and reliability over technical enthusiasm.

### C4 Vocational and professional relevance of evaluation

The essential content topics require students to apply the following knowledge:

- The role of testing and evaluation within AI-related job roles.
- Evaluation as a core professional responsibility rather than an optional activity.
- Professional accountability for decisions and outcomes produced by AI systems.
- The need to challenge AI outputs and recognise limitations and uncertainty.
- The importance of documentation and transparent reporting of evaluation results.
- How evaluation evidence supports governance, auditability and compliance.
- The communication of evaluation findings to technical and non-technical stakeholders.

Students should understand that testing and evaluation skills are essential employability skills in AI-enabled sectors.

 

## Assessment criteria

### Learning aim A: Examine the factors that affect the reliability and trustworthiness of AI systems

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe the role of AI in decision-making.<br>**A.P2** Describe factors that affect the reliability and trustworthiness ofAI systems. | **A.M1** Explain how limitations, uncertainty and risk can affect the reliability and trustworthiness of AI systems. | **A.D1** Evaluate the importance of reliability, trust and accountability when deploying AI systems. |

### Learning aim B: Explore testing and evaluation methods used on AI systems

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Describe how testing and evaluation are carried out at different stages of the AI lifecycle.<br>**B.P4** Describe methods used to evaluate AI system performance. | **B.M2** Explain how testing and evaluation techniques are used to identify errors, bias and limitations, and to support the responsible, ethical and accountable use of AI systems. | **B.D2** Evaluate the effectiveness of testing and evaluation approaches used for an AI system. |

### Learning aim C: Apply testing and evaluation techniques on an AI model

| Pass | Merit | Distinction |
|---|---|---|
| **C.P5** Apply basic testing or evaluation techniques to an AI system in a practical or vocational scenario.<br>**C.P6** Interpret evaluation results and describe what they indicate about the performance of the AI system. | **C.M3** Explain the strengths, weaknesses, limitations and suitability of an AI system. | **C.D3** Evaluate the suitability and readiness of an AI system. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS * |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for Pearson Set Assignment (PSA)

Pearson sets the assignment for the assessment of this unit.

The PSA will take 9 hours to complete.

The PSA will be marked by centres and verified by Pearson.

The PSA will be valid for the lifetime of this qualification.

### Assessing the PSA

You will make assessment decisions for the PSA using the assessment criteria provided.

The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on PSAs. There is also further information on our website.

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

#### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

#### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

#### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should evaluate the importance of reliability, trust and accountability in the deployment of artificial intelligence systems. They should make justified judgements about the potential consequences of unreliable or untrustworthy AI systems for individuals, organisations and wider society. Evidence should demonstrate balanced consideration of risks, limitations and responsibilities, supported by relevant examples. Strong responses may consider circumstances where AI systems should not be used or where additional safeguards are required.

**For merit standard**, students should explain how factors such as uncertainty, bias, limitations, risk and human oversight can influence the reliability and trustworthiness of artificial intelligence systems. They should explain how these factors affect the quality of AI outputs and the decisions made using them. Evidence should demonstrate clear understanding of the relationship between AI system performance, trust and risk across different contexts, supported by appropriate examples.

**For pass standard**, students should demonstrate a basic understanding of the role of artificial intelligence in supporting decision-making and the importance of reliability and trustworthiness in AI systems. They should be able to describe common uses of AI systems and identify factors that can affect the reliability and trustworthiness of AI outputs, such as data quality, bias, uncertainty and human oversight. Evidence is likely to be descriptive in nature and should show accurate use of key terminology and an awareness that AI systems can make errors and should not always be relied upon without question.

### Learning aim B

**For distinction standard**, students should evaluate the effectiveness of testing and evaluation approaches used for a specific AI system or scenario. They should make justified judgements about whether evaluation methods adequately address reliability, fairness and responsible use. Evidence should include balanced consideration of strengths and limitations and demonstrate critical thinking. Strong responses may include reasoned recommendations for improving evaluation practices.

**For merit standard**, students should explain how testing and evaluation techniques a re used to identify errors, bias and limitations in AI systems. They should explain how evaluation results inform decisions such as model improvement, refinement or rejection. Students should also explain the role of testing and evaluation in supporting responsible and accountable AI use, demonstrating understanding of why performance checking is essential beyond technical accuracy. Evidence should show clear links between evaluation practice and ethical responsibility.

**For pass standard**, students should be able to describe how testing and evaluation are carried out at different stages of the AI development process. This may include outlining the difference between training, validation and testing and describing basic approaches used to assess AI system performance. Students should also identify ethical or professional issues that arise when AI systems are not tested adequately. Evidence at this level may be introductory and descriptive but must accurately reflect the importance of testing for safe AI use.

### Learning aim C

**For distinction standard**, students should evaluate the overall suitability and readiness of an AI system for use in a practical or vocational context. They should justify conclusions by considering performance, limitations, ethical implications and potential risks together. Evidence at this level should demonstrate professional judgement, balanced evaluation and clear reasoning. Students may include recommendations for further testing, improvement or alternative approaches where appropriate.

**For merit standard**, students should explain how evaluation results influence decisions about whether an AI system is suitable for use in a specific vocational context. They should use evidence from testing to explain strengths, weaknesses and limitations of the system; and demonstrate awareness of context-specific risk. Evidence should show applied understanding, supported by clear explanation and reference to evaluation findings.

**For pass standard**, students should apply basic testing or evaluation techniques to an AI system. They should interpret evaluation results at a basic level and describe what the results indicate about system performance. Evidence should show that students can connect evaluation findings to system behaviour, even if the analysis remains simple.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 16: Work Experience
- Unit 18: AI Tools and Platforms
- Unit 19: AI for Health
- Unit 21: AI and Society

# Unit 7: Natural Language Processing (NLP)

**Level:** 3

**Unit type:** Pearson Set Assignment

**Guided learning hours:** 60

## Unit in brief

This unit introduces natural language processing. Students will know how NLP systems work and their limitations. They will know how to use them responsibly in a business context.

## Unit introduction

Natural Language Processing (NLP) is a key area of artificial intelligence that enables computer systems to understand, interpret and generate human language. NLP technologies are widely used in modern digital systems, including chatbots, virtual assistants, search engines, sentiment analysis tools, translation systems and automated customer service platforms. These systems are increasingly embedded in organisations and society, influencing communication, decision-making and access to information.

In this unit, you will learn how NLP systems are designed and evaluated; develop practical skills in data analysis, programming and model testing; and critically examine how NLP applications are managed and used across different sectors. The unit emphasises both technical understanding and responsible practice, ensuring students appreciate the societal and business impact of language-based AI systems.

The unit supports progression to further study, apprenticeships or employment in digital technologies, artificial intelligence, data analysis, business intelligence and related fields.

## Learning aims

In this unit you will:

**A** Understand the core concepts and techniques of NLP

**B** Understand how NLP is designed, managed and used

**C** Develop and test NLP solutions.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand the core concepts and techniques of NLP | **A1** Fundamentals of natural language processing<br>**A2** NLP within artificial intelligence and machine learning<br>**A3** NLP technologies and techniques<br>**A4** NLP in society, business and organisations<br>**A5** Ethical considerations in natural language processing | This unit is assessed through a Pearson Set Assignment. |
| **B** Understand how NLP is designed, managed and used | **B1** NLP applications across sectors<br>**B2** Design considerations for NLP systems<br>**B3** Management and governance of NLP systems<br>**B4** Impact and consequences of NLP use<br>**B5** Judgement and recommendations | |
| **C** Develop and test NLP solutions | **C1** Working with text data<br>**C2** Programming concepts for NLP<br>**C3** Applying NLP techniques<br>**C4** Testing NLP systems<br>**C5** Evaluation and improvement | |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand the core concepts and techniques of NLP

#### A1 Fundamentals of natural language processing

The essential content topics require students to apply the following knowledge:

- What is meant by natural language (spoken or written human language).
- The purpose of NLP systems, such as understanding text, extracting meaning, or generating responses.
- The difference between NLP and other AI areas, such as image recognition or numerical prediction.
- Why human language presents challenges for computers, including ambiguity, variation in meaning, idioms, sarcasm and cultural context.

Students should clearly understand that NLP systems do not understand language like humans, but instead analyse patterns and structures within language data.

#### A2 NLP within artificial intelligence and machine learning

The essential content topics require students to apply the following knowledge:

- The relationship between artificial intelligence, machine learning and NLP.
- The role of data in training NLP systems.
- How NLP systems learn patterns, associations and probabilities from language data.
- The idea of models producing probabilistic outputs, not guaranteed correct answers.

Students should develop awareness that language models reflect the data they are trained on and may behave unpredictably when used outside their intended context.

#### A3 NLP technologies and techniques

The essential content topics require students to apply the following knowledge:

- Text as data input (documents, messages, queries, conversations).
- Basic NLP operations such as:
  - splitting text into units for analysis
  - identifying patterns, keywords or themes
  - recognising sentiment, intent or category.
- Outputs produced by NLP systems, such as classifications, responses or summaries.

The emphasis should be on what these technologies do, not how to mathematically design them.

### A4 NLP in society, business and organisations

The essential content topics require students to apply the following knowledge:

- Search engines and information retrieval.
- Digital assistants and chatbots.
- Automated moderation of online content.
- Public service communication and accessibility tools.
- How NLP affects communication between people and organisations.
- The role of NLP in shaping access to information.
- The potential for misunderstanding, exclusion or harm due to incorrect language interpretation.
- Customer service chatbots and virtual agents.
- Sentiment analysis of customer feedback.
- Market research and brand monitoring.
- Automation of document analysis and reporting.

Students should understand both the social and business value of NLP and the risks of deploying poorly designed language systems.

### A5 Ethical considerations in natural language processing

The essential content topics require students to apply the following knowledge:

- Bias in language data and how it can affect NLP outputs.
- Representation and fairness for different groups.
- Privacy risks when analysing personal text or communications.
- Transparency and explainability of automated language decisions.
- The risk of over-reliance on automated text interpretation.

Students should recognise that ethical NLP requires careful design, evaluation and governance.

## Learning aim B: Understand how NLP is designed, managed and used

### B1 NLP applications across sectors

The essential content topics require students to apply the following knowledge and skills:

- Business and customer interaction.
- Healthcare and wellbeing monitoring.
- Education and automated assessment.
- Media, communications and social platforms.
- Public services and accessibility tools.

Students should understand the purpose of the system and its intended benefits.

### B2 Design considerations for NLP systems

The essential content topics require students to apply the following knowledge:

- Choice of data and training sources.
- Intended users and use cases.
- Constraints and safeguards built into systems.
- Limitations placed on language interpretation.

Design decisions should be linked to both performance and ethical impact.

### B3 Management and governance of NLP systems

The essential content topics require students to apply the following knowledge:

- How organisations monitor NLP systems over time.
- Accountability for automated language decisions.
- The role of human oversight.
- Ongoing testing and review after deployment.

Students should understand that NLP systems require continuous management, not one-time deployment.

### B4 Impact and consequences of NLP use

The essential content topics require students to apply the following knowledge:

- Benefits delivered by NLP systems.
- Risks and unintended consequences.
- Effects on users, workers and wider society.
- Issues of trust, transparency and harm.

### B5 Judgement and recommendations

The essential content topics require students to apply the following knowledge:

- Evaluating suitability for context.
- Weighing benefits against risks.
- Proposing improvements or alternatives.
- Justifying arguments using evidence and reasoning.

## Learning aim C: Develop and test NLP solutions [SP-PS]

### C1 Prepare text datasets for NLP tasks

The essential content topics require students to apply the following knowledge and skills:

- Examining the structure and content of supplied text datasets.
- Identifying:
  - categories
  - labels
  - patterns
  - trends
  - common language features.
- Recognising data quality issues, including:
  - duplicate records
  - missing values
  - inconsistent formatting
  - irrelevant text.
- Cleaning text data.
- Converting text into a consistent format.
- Removing punctuation and non-text characters.
- Removing stop words.
- Tokenising text into words or phrases.
- Applying stemming or lemmatisation where appropriate.
- Organising prepared data for processing.

Students should understand that data preparation directly influences the quality of NLP outputs.

### C2 Develop an NLP solution

The essential content topics require students to apply the following knowledge and skills:

- Programming fundamentals, including:
  - using variables and constants
  - using strings, lists and dictionaries
  - applying selection and iteration
  - creating and using functions
  - reading data from files and datasets
  - writing outputs to screen or files.

- Programming tools, including:
  - Python programming environments
  - educational AI and machine learning platforms
  - pre-built NLP libraries and tools.
- NLP implementation techniques, including:
  - text preprocessing
  - keyword extraction
  - word frequency analysis
  - pattern matching
  - rule-based classification
  - sentiment analysis
  - intent classification
  - text categorisation
  - use of pre-trained language models and NLP pipelines.
- NLP libraries and frameworks, including:
  - NLTK
  - spaCy
  - TextBlob
  - Hugging Face pipelines.

Students should understand how programming logic and NLP techniques affect system behaviour and outputs.

**C3 Testing NLP system performance**

The essential content topics require students to apply knowledge and skills:

- Testing techniques, including:
  - creating and executing test cases
  - using unseen records from supplied datasets
  - comparing expected and actual outputs
  - recording test results
  - repeating tests following modifications.
- Testing scenarios, including:
  - short and long text inputs
  - ambiguous language
  - misspelled words
  - slang and abbreviations
  - mixed sentiment statements
  - unusual sentence structures.

- Performance measures, including:
  - correct classifications
  - incorrect classifications
  - false positives
  - false negatives
  - accuracy
  - precision
  - recall.

Students should understand that language variation makes NLP testing more complex than traditional software testing.

**C4 Evaluate and improve NLP solutions**

The essential content topics require students to apply the following knowledge and skills:

- Evaluation techniques, including:
  - reviewing testing evidence
  - comparing outcomes against requirements
  - identifying strengths and limitations
  - identifying patterns in errors
  - assessing consistency and reliability.
- Improvement techniques, including:
  - refining preprocessing methods
  - adjusting classification rules
  - improving prompts
  - modifying model parameters
  - retesting after changes
  - comparing performance before and after modifications.
- Responsible development, including:
  - identifying potential bias in outputs
  - recognising fairness issues
  - considering the impact of inaccurate classifications
  - determining when human review is required.

Students should use objective testing evidence to justify evaluations and recommendations for improvement.

## Assessment criteria

### Learning aim A: Understand the core concepts and techniques of NLP

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe the purpose of natural language processing as a branch of artificial intelligence.<br>**A.P2** Describe how natural language processing technologies are used in society and business. | **A.M1** Analyse how natural language processing systems operate, including how data, models and algorithms contribute to outputs. | **A.D1** Evaluate the relationship between natural language processing technologies and ethical risk. |

### Learning aim B: Understand how NLP is designed, managed and used

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Describe how a natural language processing system is designed, managed and used. | **B.M2** Explain how design and management choices influence a natural language processing system in practice. | **B.D2** Evaluate the suitability and effectiveness of a natural language processing system. |

### Learning aim C: Develop and test NLP solutions

| Pass | Merit | Distinction |
|---|---|---|
| **C.P4** Prepare a supplied dataset for use in a natural language processing task.<br>**C.P5** Develop and test a natural language processing solution using programming tools and techniques. | **C.M3** Explain how implementation, testing and refinement decisions affect the performance of a natural language processing solution. | **C.D3** Evaluate the effectiveness and limitations of a natural language processing solution. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
| --- | --- | --- | --- |
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS * |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
| --- | --- |
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for Pearson Set Assignment (PSA)

Pearson sets the assignment for the assessment of this unit.

The PSA will take 9 hours to complete.

The PSA will be marked by centres and verified by Pearson.

The PSA will be valid for the lifetime of this qualification.

### Assessing the PSA

You will make assessment decisions for the PSA using the assessment criteria provided.

The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on PSAs. There is also further information on our website.

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

#### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

#### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools
  - access to a programming environment capable of text processing, such as a block-based or scripting environment.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

#### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should demonstrate evaluative understanding by critically evaluating the relationship between natural language processing technologies and ethical risk. They should make reasoned judgements about how data selection, model design and organisational use affect social and business outcomes. Evidence at this level should demonstrate depth of insight, independence of thought and justified conclusions that go beyond taught examples. Students should show awareness of the trade-offs and limitations inherent in language-based AI systems.

**For merit standard**, students should explain how natural language processing systems operate, including the role of text data, models and algorithms in producing outputs. They should demonstrate understanding of how design choices influence system behaviour and explain ethical implications in more depth. Students should analyse ethical issues such as bias in language data, representation of different social groups, transparency of automated language decisions and risks to privacy. Evidence should show logical reasoning, clear explanation and links between technical characteristics and ethical impacts.

**For pass standard**, students should demonstrate a basic but accurate understanding of natural language processing and its role within artificial intelligence. They should be able to describe the purpose and key characteristics of NLP systems; outline how such systems operate at a conceptual level; and describe examples of their use in society and business. Students should also identify ethical issues associated with NLP, such as bias or privacy, even if discussion remains introductory. Evidence at this level is likely to be descriptive. Assessors should ensure that terminology is used correctly and that students do not present NLP systems as possessing human understanding or judgement.

### Learning aim B

**For distinction standard**, students should evaluate the suitability and effectiveness of an NLP system in a real-world or vocational context. They should make justified judgements that consider technical performance, ethical implications and organisational responsibility together. Evidence should be balanced, analytical and well-reasoned. It may include recommendations for improvement, safeguards or alternative approaches where ethical or practical risks are identified.

**For merit standard**, students should explain how design and management choices influence the performance, reliability and ethical use of an NLP system in practice. They should explain how factors such as data choice, constraints, human oversight or monitoring affect outcomes. Students should also explain the impact of the NLP system on users or stakeholders within the chosen sector. Evidence should show applied understanding, supported by relevant examples and demonstrate awareness of organisational responsibility.

**For pass standard**, students should identify and describe real-world applications of natural language processing across one or more sectors, such as business, healthcare, education or media. They should describe how an NLP system is designed and managed for use in a real-world or vocational context, including its intended purpose and basic operational approach. Evidence may be descriptive but must clearly link the real-world application to NLP concepts.

## Learning aim C

**For distinction standard,** students should evaluate the effectiveness and limitations of a natural language processing solution using evidence gathered from testing. They should make justified judgements about how effectively the solution meets its intended purpose and requirements. Students should consider the impact of data preparation, programming approaches and testing outcomes on system performance. Evidence should demonstrate critical reflection on the reliability, consistency and appropriateness of outputs, supported by reasoned conclusions. Students should identify limitations, including potential bias, inaccuracies or contextual weaknesses and justify recommendations for improvement based on testing evidence.

**For merit standard,** students should explain how data preparation, implementation and testing decisions affect the performance of a natural language processing solution. They should explain how techniques such as text cleaning, tokenisation, classification methods, rule creation, model selection or parameter settings influence outputs and system behaviour. Students should explain how testing identifies errors, inconsistencies and limitations and how refinements can improve performance. Evidence should demonstrate clear links between development decisions, testing outcomes and overall system effectiveness.

**For pass standard,** students should prepare a supplied dataset for use in a natural language processing task and develop and test a basic natural language processing solution that produces outputs from text data. Students should demonstrate practical application of appropriate programming tools and techniques, including preparing text data, implementing NLP functionality and carrying out testing using suitable test cases. Evidence should show that students can generate outputs, record testing results and demonstrate that the solution meets its intended purpose. At this level, analysis may be straightforward, but students should demonstrate an understanding of how their actions contribute to the operation of the NLP solution.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 8: Computer Vision Basics
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 17: Creating Chatbots
- Unit 18: AI Tools and Platforms
- Unit 21: AI and Society

# Unit 8: Computer Vision Basics

**Level:** 3

**Unit type:** Pearson Set Assignment

**Guided learning hours:** 60

## Unit in brief

This unit introduces computer vision, an AI discipline focused on interpreting images and video. It explores the technical, ethical and societal impacts of visual AI systems in various contexts.

## Unit introduction

Computer vision is a specialist area of AI that enables computer systems to interpret, analyse and make decisions based on visual data such as images and video. It underpins a wide range of modern technologies, including facial recognition, medical imaging, autonomous vehicles, security systems, quality inspection in manufacturing and augmented reality applications.

In this unit you will be introduced to the core concepts, technologies and ethical issues associated with computer vision, combining theoretical understanding with practical skills. You will explore how visual data is captured and processed and how computer vision systems are designed and evaluated. You will also explore how they are applied across different sectors. Throughout the unit, you will consider the impact of computer vision on business, society and the workplace, with a strong emphasis on responsible and ethical use.

The unit supports progression to further study or employment in AI, data science, digital technologies, engineering, media technologies and other AI-enabled fields.

## Learning aims

In this unit you will:

**A** Explore computer vision concepts, technologies and ethical issues

**B** Examine computer vision applications and their wider impact

**C** Develop, test and evaluate computer vision systems.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Explore computer vision concepts, technologies and ethical issues. | **A1** Introduction to computer vision<br>**A2** Visual data and AI systems<br>**A3** Core computer vision technologies<br>**A4** Ethical issues in computer vision | This unit is assessed through a Pearson Set Assignment. |
| **B** Examine computer vision applications and their wider impact. | **B1** Computer vision applications across sectors<br>**B2** Design and deployment considerations<br>**B3** Impact on business, society and the workplace<br>**B4** Judgement and recommendations | |
| **C** Develop,test and evaluate computer vision systems. | **C1** Working with visual data<br>**C2** Programming concepts for computer vision<br>**C3** Applying computer vision techniques<br>**C4** Testing and evaluation of computer vision systems<br>**C5** Reflecting on model performance | |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Explore computer vision concepts, technologies and ethical issues

#### A1 Introduction to computer vision

The essential content topics require students to apply the following knowledge:

- Computer vision as the ability of machines to acquire, process and analyse visual information from images and video.
- How computer vision differs from human vision, including the fact that systems do not 'see' in a human sense but analyse numerical representations of images.
- The reasons computer vision is challenging, such as variation in lighting, angles, backgrounds, resolution and visual noise.
- Typical tasks computer vision systems perform, including recognising objects, identifying patterns, detecting motion and classifying images.

Students should understand that computer vision systems approximate interpretation through computation, rather than genuine visual understanding.

#### A2 Visual data and AI systems

The essential content topics require students to apply the following knowledge:

- Images and video as digital data made up of pixels organised into grids.
- How pixel values represent colour and brightness.
- The difference between raw visual data and processed features.
- How visual features (such as edges, shapes or patterns) are extracted and analysed by computer vision systems.
- The relationship between visual input data, AI models and output decisions or classifications.

Students should understand that data quality and representation have a direct impact on computer vision performance.

#### A3 Core computer vision technologies

The essential content topics require students to apply the following knowledge:

- Image classification, where systems assign images to predefined categories.
- Object detection, where systems locate and identify specific objects within an image or video frame.
- Facial recognition and feature matching, including how systems compare visual patterns.

- Video and motion analysis, where systems track movement across multiple frames.
- The use of trained AI models to automate visual interpretation tasks.

The emphasis should be on what these technologies do, where they are used and what their limitations are, rather than how to mathematically construct them.

### A4 Ethical issues in computer vision

The essential content topics require students to apply the following knowledge:

- Privacy concerns related to image and video capture, surveillance and monitoring.
- Bias in computer vision systems, particularly when models are trained on non-representative datasets.
- Risks associated with facial recognition, including misidentification and unequal performance across demographic groups.
- The potential misuse of visual data for monitoring, profiling or discrimination.
- The importance of transparency, accountability and consent when deploying visual AI systems.

Students should understand that ethical issues in computer vision are often more visible and impactful than in other AI areas, because they directly involve people's identities and environments.

## Learning aim B: Examine computer vision applications and their wider impact

### B1 Computer vision applications across sectors

The essential content topics require students to apply the following knowledge:

- Retail and business, including customer analysis and quality control.
- Healthcare, such as medical imaging and diagnostic support.
- Security and public services, including surveillance and access control.
- Manufacturing and engineering, including automation and defect detection.
- Transport and smart systems, including autonomous navigation.

Students should understand the intended purpose and benefits of these systems.

### B2 Design and deployment considerations

The essential content topics require students to apply the following knowledge:

- Data selection and preparation decisions.
- System accuracy versus cost and complexity.
- Trade-offs between automation and human oversight.
- Safeguards built into systems to manage risk.

Students should recognise that design decisions shape both outcomes and ethical impact.

### B3 Impact on business, society and the workplace

The essential content topics require students to apply the following knowledge:

- Benefits such as efficiency, speed and consistency.
- Risks such as job displacement, surveillance and loss of privacy.
- Effects on trust and public confidence in technology.
- Changes to workplace roles and skill requirements.

Students should understand that technological impact extends beyond technical performance.

### B4 Judgement and recommendations

The essential content topics require students to apply the following knowledge:

- Evaluate whether computer vision is appropriate for a given context.
- Weigh benefits against risks and limitations.
- Propose improvements, safeguards or alternative solutions.
- Justify recommendations using evidence and reasoning.

## Learning aim C: Develop, test and evaluate computer vision systems

### C1 Working with visual data

The essential content topics require students to apply the following knowledge:

- Exploring collections of images or videos to understand size, format and structure.
- Comparing different types of visual data, such as high-resolution versus low-resolution images.
- Identifying inconsistencies or noise, such as blurry images or poor lighting.
- Recognising how variation in data affects model accuracy and reliability.
- Reflecting on how biased or unbalanced datasets can affect outcomes.

Students should understand that visual datasets rarely represent reality perfectly.

### C2 Programming concepts for computer vision

The essential content topics require students to apply the following knowledge:

- Loading and storing image or video data within a program.
- Using programming logic to manipulate images, such as resizing, filtering or segmenting visual data.
- Applying conditional logic to respond differently depending on visual outputs.
- Understanding how software libraries or tools enable computer vision functionality.
- Recognising the importance of clear, structured code when working with complex data.

The aim is to show how programming enables computer vision, not to train advanced developers.

### C3 Applying computer vision techniques

The essential content topics require students to apply the following knowledge:

- Using tools or models to classify images.
- Identifying simple objects or features within images.
- Observing model behaviour across multiple visual inputs.
- Comparing expected and actual outputs.

Students should be encouraged to question results and explore why systems behave as they do.

### C4 Testing and evaluation of computer vision systems

The essential content topics require students to apply the following knowledge:

- Using varied images or videos to test system consistency.
- Comparing performance across different scenarios or conditions.
- Identifying incorrect, inconsistent or biased outputs.
- Recording and summarising test outcomes.

Students should understand that testing is essential to uncover hidden weaknesses.

### C5 Reflecting on model performance

The essential content topics require students to apply the following knowledge:

- Identify strengths and weaknesses in system performance.
- Explain why systems may fail in certain contexts.
- Reflect on ethical and practical risks associated with poor accuracy.
- Suggest ways performance could be improved or risks reduced.

Evaluation should focus on interpretation and reasoning, not numerical scores.

 

## Assessment criteria

### Learning aim A: Explore computer vision concepts, technologies and ethical issues

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe the purpose and key features of computer vision.<br>**A.P2** Describe ethical issues associated with computer vision systems. | **A.M1** Explain the purpose, features and ethical issues associated with computer vision systems. | **A.D1** Evaluate the benefits and ethical risks of using computer vision systems. |

### Learning aim B: Examine computer vision applications and their wider impact

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Describe the use of computer vision systems across different sectors.<br>**B.P4** Describe the impact of computer vision systems on organisations, society and the workplace. | **B.M2** Explain how design and deployment decisions influence the use of computer vision systems. | **B.D2** Evaluate the suitability and impact of computer vision systems in a given context. |

### Learning aim C: Develop, test and evaluate computer vision systems

| Pass | Merit | Distinction |
|---|---|---|
| **C.P5** Prepare visual data for a computer vision task.<br>**C.P6** Develop a computer vision solution using programming methods or appropriate tools. | **C.M3** Test and refine a computer vision system using feedback from results. | **C.D3** Evaluate the effectiveness and suitability of a computer vision system using evidence from testing. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |



 

## Essential information for Pearson Set Assignment (PSA)

Pearson sets the assignment for the assessment of this unit.

The PSA will take 9 hours to complete.

The PSA will be marked by centres and verified by Pearson.

The PSA will be valid for the lifetime of this qualification.

### Assessing the PSA

You will make assessment decisions for the PSA using the assessment criteria provided.

The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on PSAs. There is also further information on our website.

# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools
  - access to a tool or programming environment capable of loading, displaying and processing image data.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

 

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should evaluate the effectiveness and ethical implications of computer vision systems in real-world contexts. They should make balanced judgements about how successfully computer vision systems achieve their intended purpose while considering ethical issues such as privacy, surveillance, bias, consent and accountability. Students should support their conclusions with relevant examples and demonstrate reasoned consideration of both benefits and risks. Evidence should go beyond explanation to include justified evaluative judgements and recommendations where appropriate.

**For merit standard**, students should explain how computer vision systems operate, including how visual data is captured, processed and interpreted to produce outputs. They should explain the role of key computer vision technologies and demonstrate understanding of how ethical issues can arise through the collection, use and analysis of visual data. Students should make clear links between technical processes and ethical concerns, such as how data quality, system design or deployment decisions may contribute to privacy risks or bias. Evidence should demonstrate accurate technical understanding supported by relevant examples.

**For pass standard**, students should demonstrate a basic but accurate understanding of computer vision and its purpose within AI. They should describe the key features of computer vision systems, including the use of images and video as data and common applications of the technology. Students should also describe ethical issues associated with computer vision systems, including privacy and bias. Evidence is likely to be descriptive and should demonstrate correct use of terminology and an awareness of both technical and ethical concepts.

### Learning aim B

**For distinction standard,** students should evaluate the suitability and impact of computer vision systems within a specific organisational, industrial or societal context. They should make balanced and justified judgements about whether the use of computer vision is appropriate, considering factors such as effectiveness, accuracy, cost, risk, ethical implications and organisational value. Students should weigh the benefits and limitations of the technology and support conclusions with relevant evidence. Where appropriate, they should propose recommendations, safeguards or alternative approaches to improve outcomes or reduce risks.

**For merit standard**, students should explain how design and deployment decisions influence the use of computer vision systems. This should include consideration of factors such as data selection and preparation, accuracy requirements, system complexity, human oversight and risk management. Students should explain how these decisions affect the benefits, limitations and potential impact of a system on organisations, users and wider society. Evidence should demonstrate clear understanding of the relationship between technical choices and real-world outcomes.

**For pass standard**, students should describe how computer vision systems are used in a range of sectors, such as healthcare, business, manufacturing, security or transport. They should also describe the impact of these systems on organisations, society and the workplace, including both benefits and challenges. Evidence should demonstrate awareness of the intended purpose of computer vision applications and their effects on people, processes and organisations. Responses are likely to be largely descriptive but should be supported by appropriate examples.

## Learning aim C

**For distinction standard**, students should evaluate the effectiveness and suitability of a computer vision system using evidence gathered through testing. They should make reasoned judgements about how well the system meets its intended purpose, considering factors such as accuracy, consistency, reliability and limitations. Students should evaluate the impact of factors including data quality, image variation and programming decisions on system performance. Evidence should demonstrate critical reflection and justified conclusions, supported by testing outcomes.

**For merit standard**, students should test a computer vision system using a range of suitable visual data and use the results to refine the solution. They should identify weaknesses, inconsistencies or errors in outputs and make appropriate improvements to the data, configuration or implementation. Students should demonstrate an understanding of how testing contributes to improving performance and reliability. Evidence should include records of testing, refinements made and the resulting improvements to system outputs.

**For pass standard**, students should prepare visual data for a computer vision task and develop a working computer vision solution using programming or appropriate tools. The prepared data should be suitable for the intended task and demonstrate consideration of factors such as image quality, consistency and relevance. The developed solution should produce outputs from visual inputs and demonstrate the application of appropriate computer vision techniques. Evidence should confirm that students can work practically with visual datasets, implement a solution and generate outputs that address the requirements of the task.


 

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 7: Natural Language Processing (NLP)
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 18: AI Tools and Platforms
- Unit 19: AI for Health
- Unit 21: AI and Society

# Unit 9: AI Algorithms

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit introduces core AI algorithms and how they are used to identify patterns, make predictions and support automated decision-making. Students apply and evaluate algorithms using data and appropriate tools, considering performance, limitations and ethical implications in real-world contexts.

## Unit introduction

AI algorithms are the mechanisms that enable AI systems to identify patterns, make predictions, classify data, and support automated decision-making. These algorithms underpin many modern applications of AI, including recommendation systems, predictive analytics, image recognition, language processing and autonomous technologies.

This unit introduces you to the purpose, characteristics and behaviour of key AI algorithms used in modern AI systems. You will explore how different algorithms work, what types of problems they are suited to and how they are implemented using data and appropriate tools or programming techniques. The unit also develops your ability to evaluate algorithm performance and limitations, taking into account ethical considerations such as bias, transparency and responsible use.

Through a combination of theoretical understanding, practical application and evaluation, students will develop skills that support progression to further study or employment in artificial intelligence, data science, computing and digital technology roles.

## Learning aims

In this unit you will:

**A** Understand how key AI algorithms work

**B** Apply AI algorithms to datasets to solve defined problems

**C** Evaluate the suitability of AI algorithms.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand how key AI algorithms work. | **A1** AI algorithms and their purpose<br>**A2** Categories of AI algorithms<br>**A3** Characteristics and behaviour of AI algorithms<br>**A4** Algorithms in modern AI applications | Students will complete a short research and explanation task (e.g. structured report or presentation notes) that defines key AI algorithm categories and explains how they work in modern AI systems, using relevant examples from real applications. |
| **B** Apply AI algorithms to datasets to solve defined problems. | **B1** Preparing data for AI algorithms<br>**B2** Selecting and applying AI algorithms<br>**B3** Interpreting algorithm outputs<br>**B4** Testing and refining algorithm solutions | Students will undertake a practical, scenario-based task where they prepare a dataset and apply at least one appropriate AI algorithm using a chosen tool or simple code, documenting the full process from input to output. |
| **C** Evaluate the suitability of AI algorithms. | **C1** Evaluating algorithm performance<br>**C2** Identifying limitations of AI algorithms<br>**C3** Ethical implications of AI algorithms<br>**C4** Real-world context and judgement | Students will produce an evaluation that compares algorithm options and appraises the chosen solution using evidence from performance measures (e.g. accuracy, errors, consistency) and observations from testing. |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand how key AI algorithms work

#### A1 AI algorithms and their purpose

Teaching should establish a clear and accurate definition of an algorithm in an AI context.

Students should understand that:

- An algorithm is a defined set of steps or procedures used to process data and produce outputs.
- In AI, algorithms enable systems to learn from data, recognise patterns, classify information, make predictions or support decisions.
- AI algorithms differ from traditional rule-based algorithms because their behaviour is influenced by data rather than only fixed rules written by programmers.
- Algorithms are central to AI system performance: selecting an unsuitable algorithm can produce inaccurate, misleading or harmful outcomes.

Students should understand that algorithms do not 'think' or make moral judgements, but operate according to design choices made by humans.

#### A2 Categories of AI algorithms

Teaching should introduce students to the main categories of AI algorithms, focusing on purpose and use rather than mathematical formulation.

Students should explore:

- Supervised learning algorithms, which learn from labelled data and are used for classification and prediction tasks. Teaching should focus on how examples with known outcomes are used to guide learning.
- Unsupervised learning algorithms, which work with unlabelled data to identify patterns, relationships or groupings. Students should understand how algorithms can organise data without predefined answers.
- Decision-making or optimisation algorithms, which support choices or actions by comparing options or identifying optimal solutions.

Students should understand when each category is appropriate and why real-world systems may combine multiple algorithm types.

### A3 Characteristics and behaviour of AI algorithms

Teaching should focus on how AI algorithms behave when learning from data.

Students should understand:

- How algorithms identify patterns and relationships in data rather than memorising individual examples.
- The concept of generalisation, where algorithms apply learning from training data to new, unseen data.
- The risks of relying too heavily on training data, leading to poor performance outside controlled conditions.
- That algorithm behaviour is shaped by data quality, volume and representativeness.

Students should recognise that algorithm behaviour is predictable in design but uncertain in outcome, particularly in complex or changing contexts.

### A4 Algorithms in modern AI applications

Teaching should connect algorithm theory to real-world applications.

Students should explore:

- How algorithms are used in systems such as recommendation engines, fraud detection, forecasting tools and pattern recognition technologies.
- Why organisations often test and compare different algorithms before selecting a solution.
- That algorithm selection depends on the problem, data available, performance requirements and ethical considerations.

The emphasis should be on understanding contextual suitability, not technical optimisation.

## Learning aim B: Apply AI algorithms to datasets to solve defined problems

### B1 Preparing data for AI algorithm

Teaching should emphasise that data preparation is essential for effective algorithm application.

Students should apply skills in:

- Understanding different data types used in AI systems, such as numerical, categorical or text-based data.
- Exploring datasets to identify structure, patterns or anomalies.
- Recognising issues such as missing values, inconsistencies, imbalance or bias.
- Understanding how poor data quality leads to unreliable algorithm outputs.

Students should understand that data preparation directly impacts algorithm performance and fairness.

### B2 Selecting and applying AI algorithms

Teaching should support students in applying AI algorithms using accessible tools or programming techniques.

Students should be able to:

- Select algorithms appropriate to a defined problem, such as classification, prediction or grouping.
- Use tools, platforms or code to apply algorithms to datasets.
- Configure basic parameters where appropriate.
- Generate outputs such as predictions, classifications or groupings.

The emphasis should be on correct application and understanding, not advanced coding or parameter tuning.

### B3 Interpreting algorithm outputs

Teaching should focus on developing students' ability to interpret outputs critically.

Students should explore:

- The types of outputs produced by AI algorithms.
- How to relate outputs back to the defined problem.
- Why outputs may include uncertainty or probability rather than definite answers.
- Situations where outputs appear correct but may still be unsuitable.

Students should be encouraged to question results rather than assume correctness.

### B4 Testing and refining algorithm solutions

Teaching should reinforce the importance of testing.

Students should:

- Test algorithms with different datasets or inputs.
- Observe variations in outputs and performance.
- Identify unexpected results or limitations.
- Make simple refinements, such as trying alternative algorithms or adjusting inputs.

Testing should be understood as a normal and necessary part of algorithm use.

## Learning aim C: Evaluate the suitability of AI algorithms

### C1 Evaluating algorithm performance

Teaching should guide students to evaluate algorithms in a balanced way.

Students should understand:

- How performance is judged relative to the problem being solved.
- That high accuracy is not always the most important factor.
- That performance must be considered alongside reliability and consistency.
- The limitations of relying on a single performance measure.

Students should understand that performance is context-dependent.

### C2 Identifying limitations of AI algorithms

Teaching should help students recognise where algorithms struggle.

Students should evaluate:

- Limitations caused by insufficient or biased data.
- Algorithms making incorrect assumptions about data patterns.
- Poor generalisation to real-world conditions.
- Scenarios where algorithm outputs are misleading or incomplete.

Students should understand that no algorithm is universally suitable.

### C3 Ethical implications of AI algorithms

Teaching should integrate ethics strongly into algorithm evaluation.

Students should consider:

- How bias can arise from algorithm design or training data.
- Transparency and explainability of algorithm outputs.
- Accountability for automated decisions affecting individuals or groups.
- The impact of algorithm use on trust, fairness and inclusion.

Students should recognise ethical responsibility as part of professional practice.

### C4 Real-world context and judgement

Teaching should place algorithms firmly within vocational and real-world contexts.

Students should:

- Evaluate algorithm use across sectors such as business, healthcare, finance or public services.
- Balance technical effectiveness with ethical, practical and organisational factors.
- Make justified conclusions about whether an algorithm is suitable for use.
- Propose improvements, safeguards or alternative approaches where necessary.

The highest-level learning should demonstrate balanced, evidence-based judgement.

## Assessment criteria

### Learning aim A: Understand how key AI algorithms work

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe the purpose and role of AI algorithms in modern systems.<br>**A.P2** Describe key characteristics and functions of AI algorithms. | **A.M1** Explain how AI algorithms work, their suitability, and how data and design choices affect outcomes. | **A.D1** Evaluate how AI algorithms work and suit real-world tasks. |

### Learning aim B: Apply AI algorithms to datasets to solve defined problems

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Prepare data for an AI algorithm.<br>**B.P4** Apply an AI algorithm to solve a defined problem. | **B.M2** Test and refine an AI solution to improve outcomes. | **B.D2** Evaluate the effectiveness and suitability of an AI solution using evidence from testing. |

### Learning aim C: Evaluate the suitability of AI algorithms

| Pass | Merit | Distinction |
|---|---|---|
| **C.P5** Describe the performance and limitations of AI algorithms used in real-world applications.<br>**C.P6** Describe factors that affect the suitability of AI algorithms in practical contexts. | **C.M3** Explain how performance, accuracy and ethics affect AI system suitability. | **C.D3** Evaluate AI algorithms for effectiveness, limitations, performance, accuracy and ethical responsibility. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.P2, A.M1, A.D1)

Learning aim B: (B.P3, B.P4, B.M2, B.D2)

Learning aim C: (C.P5, C.P6, C.M3, C.D3)

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

**Hardware**

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

**Software and digital tools**

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
    - word processing
    - presentation software.
- Web-based or installed AI tools, for example:
    - visual or no-code AI platforms
    - educational machine learning tools.
- Data handling tools, such as:
    - spreadsheet software
    - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

**Data resources**

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
    - ethically sourced
    - appropriate for educational use
    - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should demonstrate evaluative understanding. They should evaluate the suitability of different AI algorithms for specific real-world tasks, making reasoned judgements about how algorithm characteristics influence performance, reliability and appropriateness. Evidence should show depth of insight, independent thinking and justified conclusions, including awareness that algorithm choice involves trade-offs rather than absolute solutions.

**For merit standard**, students should explain how different AI algorithms operate and why they are suited to specific types of problems. They should demonstrate understanding of how algorithm behaviour is influenced by data, learning approach and design choices. Students should analyse the strengths and weaknesses of different algorithms, explaining how these factors affect reliability, flexibility and outcomes. Evidence should show clear reasoning, appropriate technical language and logical structure.

**For pass standard**, students should demonstrate a basic but accurate understanding of the role of algorithms within AI systems. They should be able to describe what AI algorithms are designed to do and identify key characteristics of different types of algorithms used in modern AI systems. Evidence at this level is likely to be descriptive and explanatory in nature. Assessors should ensure that students use appropriate terminology correctly and do not suggest that algorithms possess human judgement or intelligence.

### Learning aim B

**For distinction standard,** students should evaluate the effectiveness and suitability of an AI solution using evidence gathered through testing and refinement. They should make justified judgements about how well the chosen algorithm solves the defined problem, considering factors such as the quality of the outputs, reliability, consistency and any limitations identified during testing. Students should evaluate the impact of data preparation and algorithm selection on outcomes and support their conclusions with evidence from their own practical work. Evidence should demonstrate balanced judgement, critical reflection and well-supported conclusions.

**For merit standard,** students should test an AI solution using different datasets, inputs or conditions and refine the solution based on the results obtained. They should identify issues such as inaccuracies, inconsistencies, unexpected outputs or limitations and make appropriate improvements to the data, algorithm choice or configuration. Students should demonstrate an understanding of how testing and refinement contribute to improved performance. Evidence should include records of testing activities, refinements made and the resulting changes to outputs.

**For pass standard,** students should prepare data for an AI algorithm and apply the algorithm to solve a defined problem using appropriate tools or programming techniques. Data preparation should demonstrate consideration of factors such as data type, structure, quality, missing values, inconsistencies, imbalance or bias. The applied solution should generate outputs that address the defined problem, such as classifications, predictions or groupings. Students should demonstrate an understanding of the purpose of the algorithm and interpret outputs at a basic level in relation to the problem being solved. Evidence should confirm that students can work effectively with data, apply an appropriate AI algorithm and produce valid outputs.

## Learning aim C

**For distinction standard**, students should evaluate the effectiveness and limitations of AI algorithms in real-world contexts, making justified judgements that consider technical performance, accuracy and ethical responsibility together. Evidence should show balanced evaluation, independent reasoning and awareness of trade-offs between efficiency, fairness and organisational or societal impact. Strong responses may include reasoned recommendations for alternative approaches, safeguards or constraints where ethical or practical risks outweigh benefits.

**For merit standard**, students should explain how algorithm performance and accuracy affect the suitability of AI systems in specific contexts. They should explain ethical implications in more depth, showing how algorithm design, data use and deployment choices influence fairness, accountability or trust. Evidence should demonstrate applied understanding supported by relevant examples.

**For pass standard**, students should describe the performance and limitations of AI algorithms used in real-world applications. They should also describe ethical issues associated with algorithm use, such as bias, lack of transparency or potential misuse. Evidence at this level may be descriptive but must clearly link algorithm behaviour to real-world consequences.


 

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 7: Natural Language Processing (NLP)
- Unit 8: Computer Vision Basics
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 12: Robotics and AI
- Unit 13: AI Programming Techniques
- Unit 15: Big Data in AI
- Unit 19: AI for Health

# Unit 10: Hands-on AI Projects

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit provides students with the opportunity to plan, develop, test and evaluate an AI solution for a defined problem. They will apply technical, project management and evaluation skills to complete a practical AI project from inception to review.

## Unit introduction

Successful AI projects require more than technical knowledge alone; they depend on effective planning, data preparation, solution development, testing, evaluation and ethical decision-making. Across industries, AI practitioners are expected to work through an entire project lifecycle, balancing technical performance with user needs, organisational objectives and responsible use of AI technologies.

In this unit, you will plan, develop, test and evaluate an AI solution to address a defined problem. You will prepare and analyse data, select and apply appropriate AI tools, models or algorithms, and refine your solution through testing and review. You will also consider the impact of your project on users and organisations, reflecting on ethical issues, project decisions and the effectiveness of your final solution. The unit provides an opportunity to bring together the knowledge and skills developed throughout the qualification while working on a realistic, project-based AI challenge

The unit has a strong vocational focus and is designed to support students' progression into employment, apprenticeships, higher education or further specialist AI study. Students will work independently and reflectively, demonstrating initiative, problem-solving ability and professional judgement.

## Learning aims

In this unit you will:

**A** Plan an AI project

**B** Develop, test and refine an AI solution

**C** Evaluate an AI project and its outcomes.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Plan an AI project | **A1** Project definition<br>**A2** Selecting AI approaches<br>**A3** Ethical and legal considerations<br>**A4** Project planning | Students will identify a suitable AI project, define objectives and requirements, select appropriate technologies and data sources, consider ethical implications, and produce a plan for developing the solution. |
| **B** Develop, test and refine an AI solution | **B1** Data preparation<br>**B2** Solution development<br>**B3** Applying AI models<br>**B4** Testing and refinement<br>**B5** Documentation | Students will prepare data, develop an AI solution using appropriate tools or programming techniques, test the solution, refine it in response to findings, and demonstrate the outcomes achieved. |
| **C** Evaluate an AI project and its outcomes | **C1** Reviewing outcomes<br>**C2** Impact and suitability<br>**C3** Ethical and professional practice<br>**C4** Professional reflection | Students will review the completed project, assess how effectively objectives were achieved, evaluate the impact and suitability of the solution, and make recommendations for future improvement. |



 

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Plan an AI project [SP-CT]

#### A1 Project definition

Students will:

- Identify a realistic problem or opportunity that could be addressed using AI.
- Investigate user, client or organisational needs.
- Define project aims, objectives and success criteria.
- Produce a clear project scope, including project boundaries and constraints.
- Identify assumptions, risks and dependencies.

Students should understand how successful AI projects begin with a clearly defined problem rather than a technology-first approach.

#### A2 Selecting AI approaches

Students will:

- Explore AI techniques relevant to the project, e.g. machine learning for prediction, natural language processing for text analysis, computer vision for image recognition and generative AI for content generation.
- Compare alternative AI approaches.
- Select suitable AI tools, platforms, programming environments or libraries.
- Identify data requirements and availability.
- Consider technical feasibility and project constraints.

Students should justify why chosen AI approaches are appropriate for the intended purpose.

#### A3 Ethical and legal considerations

Students will:

- Identify ethical risks associated with the proposed project.
- Consider privacy, consent and data protection requirements.
- Investigate potential sources of bias.
- Consider fairness, transparency and accountability.
- Create risk mitigation strategies.

Students should understand that responsible AI practices should be considered throughout the project lifecycle rather than at the end of development.

### A4 Project planning

Students will:

- Produce a project plan, e.g. action plans, risk logs, progress reviews.
- Define milestones and deliverables, e.g. Gantt charts.
- Allocate resources and tools.
- Establish testing strategies, including test plans and schedules.
- Create project documentation.

Students should apply project management principles to support successful project delivery.

## **Learning aim B: Develop, test and refine an AI solution** [SP-CT]

### B1 Data preparation

Students will:

- Identify and obtain suitable datasets, e.g. cleaning datasets, removing duplicate records, labelling data, balancing categories, transforming data formats.
- Assess data relevance and suitability.
- Explore data structure, quality and completeness.
- Identify anomalies, inconsistencies and missing values.
- Prepare data for AI processing.
- Consider ethical implications of data use.

Students should understand that data quality is one of the most significant factors affecting AI solution performance.

### B2 Solution development

Students will:

- Configure AI tools and development environments, e.g. python notebooks, no-code AI platforms, low-code AI tools, cloud-based AI services.
- Develop workflows to address project objectives.
- Create and document AI processes.
- Apply programming techniques where appropriate.
- Integrate datasets into solutions.

Students should focus on producing a functional and well-structured solution rather than unnecessary technical complexity.



 

### B3 Applying AI models

Students will:

- Select and apply appropriate AI models or algorithms, e.g. classification models, clustering models, recommendation models, NLP models, computer vision models.
- Configure model parameters.
- Train models using prepared datasets where appropriate.
- Generate outputs from AI systems.
- Compare model behaviour using different approaches.
- Record development decisions.

Students should understand that model selection influences project effectiveness and outcomes.

### B4 Testing and refinement

Students will:

- Design and carry out testing activities, e.g. user testing, functional testing, edge-case testing, accuracy checks and comparative testing.
- Test solutions using multiple inputs and scenarios.
- Identify errors, weaknesses and unexpected outputs.
- Review system performance against success criteria.
- Refine and improve solutions based on findings.
- Record iteration and improvement activities.

Students should recognise testing as an ongoing process that supports continuous improvement.

### B5 Documentation

Students will:

- Maintain development records, e.g. development logs, version records.
- Record decisions and changes.
- Present evidence of testing and refinement, e.g. test reports.
- Produce technical and non-technical documentation.
- Communicate project progress to stakeholders through progress updates.

Students should understand the importance of documentation in professional AI projects.

## Learning aim C: Evaluate an AI project and its outcomes [SP-CT]

### C1 Reviewing outcomes

Students will:

- Compare outcomes with original objectives.
- Assess achievement of success criteria.
- Identify strengths and weaknesses.
- Review project constraints and challenges.
- Assess the quality of outputs produced.

Students should evaluate outcomes using evidence rather than personal opinion.

### C2 Impact and suitability

Students will:

- Assess the suitability of the solution for intended users.
- Evaluate organisational benefits.
- Consider efficiency, accuracy and usability.
- Identify limitations and risks.
- Assess scalability and future potential.

Students should consider both technical effectiveness and practical usefulness.

### C3 Ethical and professional practice

Students will:

- Review how ethical considerations were addressed.
- Evaluate fairness and transparency.
- Assess data governance and privacy controls.
- Consider potential unintended consequences.
- Reflect on responsible AI practices.

Students should understand the professional responsibilities associated with AI development.

### C4 Professional reflection

Students will:

- Review personal performance and contribution.
- Evaluate project management decisions.
- Identify skills developed during the project.
- Recommend improvements for future development, e.g. additional functionality, improved datasets, alternative AI approaches, enhanced testing methods and future user requirements.
- Propose next steps for the solution.

Students should recognise reflection as an important element of continuous professional development.


 

## Assessment criteria

### Learning aim A: Plan an AI project

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Define the objectives and requirements of an AI project.<br>**A.P2** Produce a project plan for the development of an AI solution. | **A.M1** Explain how technical, ethical and project planning decisions support the development of an AI solution. | **A.D1** Evaluate the suitability of proposed approaches for delivering an AI project. |

### Learning aim B: Develop, test and refine an AI solution

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Prepare data for an AI solution. [SP-PS]<br>**B.P4** Develop an AI solution that addresses a defined problem. [SP-PS] | **B.M2** Test and refine an AI solution to improve outcomes. | **B.D2** Evaluate the effectiveness of an AI solution using evidence from testing. |

### Learning aim C: Evaluate an AI project and its outcomes

| Pass | Merit | Distinction |
|---|---|---|
| **C.P5** Describe the outcomes of an AI project.<br>**C.P6** Describe the impact of an AI solution on users or organisations. | **C.M3** Explain how project decisions influenced the outcomes of an AI solution. | **C.D3** Evaluate the effectiveness, impact and suitability of an AI project. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT * |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS √ |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.P2, A.M1, A.D1)

Learning aim B: (B.P3, B.P4, B.M2, B.D2)

Learning aim C: (C.P5, C.P6, C.M3, C.D3)

# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should evaluate the suitability of the approaches proposed for delivering an AI project. They should make justified judgements about project objectives, technology selection, data requirements, ethical considerations and project planning decisions. Students should assess the strengths and limitations of different approaches and consider how factors such as feasibility, risk, resource availability, data quality and ethical responsibilities may influence project success. Evidence should demonstrate balanced evaluation, critical thinking and well-supported conclusions that justify why chosen approaches are appropriate for the project.

**For merit standard**, students should explain how technical, ethical and project planning decisions contribute to the successful development of an AI solution. They should explain why particular AI technologies, tools, datasets or approaches have been selected and how these choices support project objectives. Students should also explain how ethical considerations, such as bias, privacy, transparency and accountability, have influenced planning decisions. Evidence should demonstrate clear links between project requirements, technical choices and responsible AI practice.

**For pass standard**, students should define a realistic AI project by identifying its objectives, requirements, success criteria and constraints. They should produce a project plan that outlines how the AI solution will be developed, including activities, milestones, resources and timescales. Students should identify appropriate AI technologies and data requirements and demonstrate awareness of relevant ethical considerations. Evidence should confirm that the project is sufficiently planned and organised to support subsequent development and implementation activities.

### Learning aim B

**For distinction standard**, students should evaluate the effectiveness of their AI solution using evidence gathered throughout development, testing and refinement. They should make justified judgements about how well the solution meets the project objectives and success criteria, considering factors such as accuracy, reliability, consistency, usability and suitability for the intended purpose. Students should evaluate the impact of data quality, model or algorithm selection, implementation decisions and testing outcomes on overall performance. Evidence should demonstrate critical reflection, balanced reasoning and well-supported conclusions based on their project results.

**For merit standard**, students should test their AI solution using a range of inputs, datasets or scenarios and refine the solution based on the results obtained. They should identify errors, limitations, unexpected outputs or performance issues and make improvements to aspects such as data preparation, algorithms, configuration settings or implementation choices. Students should explain how testing informed refinements and how those changes improved the effectiveness of the solution. Evidence should demonstrate an iterative development process supported by testing records and development logs.

**For pass standard**, students should prepare suitable data for use within an AI project and develop an AI solution that addresses a clearly defined problem. Data preparation should include exploring, selecting and preparing data while considering factors such as quality, completeness, structure and potential bias. The developed solution should apply appropriate AI technologies, models or algorithms and generate outputs relevant to the project objectives. Evidence should demonstrate that students can develop a functioning AI solution, document their work appropriately and show an understanding of the purpose of the tools, data and techniques used.

### Learning aim C

**For distinction standard**, students should evaluate the effectiveness, impact and suitability of their AI project using evidence gathered from development, testing and project review activities. They should make justified judgements about how successfully the project met its objectives and success criteria, considering technical performance, user needs, organisational requirements and ethical responsibilities. Students should evaluate the impact of project decisions, including technology selection, data use, testing approaches and project management practices, on the quality of the final solution. Evidence should demonstrate balanced evaluation, critical reflection and well-supported conclusions. Where appropriate, students should propose recommendations, future developments or alternative approaches to improve project outcomes.

**For merit standard**, students should explain how decisions made during the planning, development and management of the project influenced the outcomes of the AI solution. This should include consideration of factors such as project objectives, success criteria, technology selection, data preparation, resource management, testing strategies and ethical considerations. Students should explain how these decisions contributed to the strengths, limitations and overall effectiveness of the project. Evidence should demonstrate clear links between project activities and final outcomes, supported by examples from their own work.

**For pass standard**, students should describe the outcomes of their AI project in relation to the original objectives and success criteria. They should describe the impact of the AI solution on users, organisations or the intended context, including relevant benefits and limitations. Students should provide evidence of project completion and demonstrate an understanding of how the solution was planned, developed and used. Evidence at this level is likely to be largely descriptive but should clearly relate project outcomes to the problem being addressed.

## Links to other units

This unit links to all the other units in the specification.

# Unit 11: AI in Business

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit examines AI applications within business environments. It establishes how responsible use of AI, quality data, tool selection, testing and project management can impact business goals and outcomes.

## Unit introduction

AI is transforming how modern businesses operate, make decisions and engage with customers. From predictive analytics, recommendation systems and customer-service chatbots to fraud detection, supply-chain optimisation and workforce planning, AI technologies are now central to organisational strategy and competitiveness.

This unit introduces you to the use of AI in business contexts, developing both technical awareness and vocational understanding. You will explore core AI concepts and ethical considerations, developing and applying practical skills in data analysis, programming and algorithm use. You will also evaluate real-world AI applications across business and specialist sectors. The unit emphasises responsible use, value creation and informed decision-making, ensuring students understand not only what AI can do, but when, why and how it should be used.

The unit supports progression to employment, apprenticeships or higher education in business, digital technologies, data analysis and AI-enabled roles.

## Learning aims

In this unit you will:

**A** Examine AI in business

**B** Evaluate AI applications and their wider impact

**C** Develop and test an AI business solution.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Examine AI in business | **A1** Core concepts of AI in business<br>**A2** AI technologies used in modern organisations<br>**A3** Data as a foundation for business AI systems<br>**A4** Ethical considerations<br>**A5** Strategic role of AI in modern organisations | A short report or presentation explaining AI concepts and technologies selected for the brief. Case-study style analysis of an AI use case in business. Ethics section covering bias, privacy, transparency and accountability, with mitigations. |
| **B** Evaluate AI applications and their wider impact | **B1** Real-world business applications of AI<br>**B2** AI applications in social and specialist sectors<br>**B3** Planning and managing AI-based business tasks<br>**B4** Evaluating impact, suitability and responsible use | A report on AI applications in various sectors, including its purpose and value to the chosen scenario. An impact evaluation discussing user/stakeholder impact, feasibility, legal/ethical implications and recommendations. |
| **C** Develop and test an AI business solution | **C1** Business data analysis for AI systems<br>**C2** Programming and tool use in business AI<br>**C3** Applying AI algorithms to business problems<br>**C4** Testing and evaluation of business AI systems in business contexts<br>**C5** Refinement and improvement | Dataset selection and preparation evidence. Program code/scripts with annotations and version evidence. Model/algorithm selection and configuration, with justification. Test plan, test results and performance measures. Evaluation and improvements/ iterations, including limitations and ethical considerations. |



 

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Examine AI in business

#### A1 Core concepts of AI in business

Students should be taught what is meant by AI in a business context and how AI differs from traditional computing systems.

Teaching should include:

- AI as systems designed to perform tasks that typically require human intelligence, such as analysing large datasets, identifying patterns, predicting outcomes or supporting decisions.
- The distinction between rule-based systems, which follow predefined instructions, and data-driven AI systems, which learn patterns from data.
- The idea that AI does not 'think' or 'decide' independently but operates within parameters set by developers, organisations and data.
- The role of AI as a decision-support tool, enhancing human judgement rather than replacing managerial responsibility.

Students should understand that incorrect assumptions about AI capability can lead to poor business decisions.

#### A2 AI technologies used in modern organisations

Students should explore the main AI technologies commonly adopted by businesses.

Teaching should cover:

- Machine learning technologies used to analyse historical data and produce forecasts or recommendations.
- Predictive analytics used in areas such as sales forecasting, demand planning and risk assessment.
- Recommendation and personalisation systems used in marketing, retail and digital platforms.
- Automation technologies that streamline repetitive tasks or processes.
- The role of cloud-based AI platforms and services in enabling scalability and integration with existing business systems.

Students should recognise how technology choices affect cost, flexibility, performance and integration within organisations.

### A3 Data as a foundation for business AI systems

Teaching should emphasise that effective AI in business depends on data quality and relevance.

Students should explore:

- Types of data used in business AI systems, such as customer, transactional, operational or behavioural data.
- Issues of data accuracy, completeness, timeliness and relevance.
- Risks associated with poor data quality, including misleading outputs and flawed insights.
- The relationship between historical data and future predictions.

Students should understand that AI systems reflect the data they are trained on and cannot compensate for fundamentally poor inputs.

### A4 Ethical considerations

Ethics should be integrated throughout teaching, rather than treated as a standalone topic.

Students should examine:

- Ethical principles such as fairness, transparency, accountability and privacy.
- How biased data or poorly designed algorithms can disadvantage individuals or groups.
- The importance of explaining and justifying AI-informed decisions to stakeholders.
- Reputational, legal and financial risks associated with unethical AI use.
- The need for organisational policies and governance frameworks to manage AI responsibly.

Students should understand that ethical AI use is critical to trust, compliance and long-term business sustainability.

### A5 Strategic role of AI in modern organisations

Students should understand why organisations adopt AI and what strategic role it plays.

Teaching should cover:

- Competitive advantage gained through improved insight, speed and efficiency.
- AI as a driver of innovation and new business models.
- Organisational challenges such as skills gaps, resistance to change and integration issues.
- Risks of over-reliance on AI without sufficient oversight.

Students should appreciate that AI adoption requires cultural as well as technical change.

## Learning aim B: Evaluate AI applications and their wider impact

### B1 Real-world business applications of AI

Students should examine how AI is used in practice.

Teaching should include:

- Customer analytics and personalisation.
- Sales, demand and financial forecasting.
- Fraud detection and risk analysis.
- Supply-chain and logistics optimisation.
- Workforce analytics and performance monitoring.

Students should understand the value these systems deliver to organisations.

### B2 AI applications in social and specialist sectors

Students should assess AI use beyond commercial business settings.

Teaching should explore:

- Healthcare AI systems and decision support.
- Financial services and regulatory compliance.
- Public-sector and social applications.
- Sector-specific ethical risks and constraints.

Students should recognise that context strongly influences acceptable AI use.

### B3 Evaluating impact, suitability and responsible use

Students should evaluate AI systems holistically.

Teaching should encourage students to:

- Assess technical effectiveness and limitations.
- Consider responsible use, legal and organisational implications.
- Evaluate financial cost, sustainability and scalability.
- Make balanced recommendations supported by evidence.

Students should demonstrate professional judgement rather than technical enthusiasm.

## Learning aim C: Develop and test an AI business solution

### C1 Business data analysis for AI systems

Students should develop practical data analysis skills relevant to AI in business.

Teaching should include:

- Identifying suitable datasets for business problems.
- Exploring datasets to identify trends, patterns and anomalies.
- Identifying missing values, bias or imbalance within data.

- Understanding how data characteristics affect AI system outputs.
- Relating data insights back to business questions and objectives.

The emphasis should be on interpretation and relevance, not advanced statistical theory.

**C2 Programming and tool use in business AI**

Students should apply basic programming or configuration skills to AI systems used in business.

Teaching should focus on:

- Using programming logic to process data and invoke AI models.
- Understanding workflows used in AI systems, such as data input, processing and output.
- Interacting with AI tools, platforms or APIs used for business applications.
- Documenting and structuring work clearly, as expected in professional environments.

Students should understand how programming choices influence automation, accuracy and maintainability.

**C3 Applying AI algorithms to business problems**

Students should apply AI algorithms to realistic business scenarios.

Teaching should include:

- Selecting algorithms suitable for tasks such as classification, prediction or recommendation.
- Applying algorithms to data to generate outputs.
- Interpreting outputs in relation to defined business objectives.
- Comparing alternative approaches where appropriate.

Students should focus on why a particular algorithm is appropriate, not on mathematical optimisation.

**C4 Testing and evaluation of business AI systems in business contexts**

Students should understand that testing is essential before AI deployment.

Teaching should involve:

- Testing AI systems using varied and realistic business scenarios.
- Evaluating outputs for accuracy, consistency and reliability.
- Identifying errors, bias or unexpected behaviour.
- Considering the consequences of inaccuracies in business decision-making.

Evaluation should be evidence-based and iterative.

### C5 Refinement and improvement

Students should reflect on testing results and consider improvement.

Teaching should include:

- Refining data inputs or algorithm settings.
- Adjusting workflows to improve performance or reduce risk.
- Recognising limitations that cannot reasonably be resolved.
- Deciding when AI is unsuitable or must be constrained.

Students should understand that refinement is a key part of professional AI practice.

## Assessment criteria

### Learning aim A: Examine AI in business

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe core AI concepts and technologies used in modern business contexts.<br>**A.P2** Describe AI technologies and their uses in different business functions. | **A.M1** Explain how AI concepts and technologies support business decisions, efficiency and performance. | **A.D1** Evaluate how AI concepts and technologies affect business value, suitability and limitations. |

### Learning aim B: Evaluate AI applications and their wider impact

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Describe real-world AI applications across commercial business settings. | **B.M2** Explain how the benefits, challenges and project management affect real-world AI use. | **B.D2** Evaluate AI applications and justify recommendations based on impact, suitability, benefits, limitations and delivery needs. |

### Learning aim C: Develop and test an AI business solution

| Pass | Merit | Distinction |
|---|---|---|
| **C.P4** Prepare data for an AI business solution.<br>**C.P5** Develop an AI solution to address a defined business problem. | **C.M3** Test and refine an AI business solution to improve outcomes. | **C.D3** Evaluate the effectiveness and suitability of an AI business solution using evidence from testing. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.P2, A.M1, A.D1)

Learning aim B: (B.P3, B.M2, B.D2)

Learning aim C: (C.P4, C.P5, C.M3, C.D3)

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

#### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

#### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

#### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students are expected to evaluate how AI concepts and technologies influence the responsible and effective use of AI in modern business environments. Students should make reasoned judgements about trade-offs that organisations face, such as efficiency versus transparency, automation versus accountability, or performance versus fairness. Distinction evidence should demonstrate depth and independence by considering multiple perspectives. Evidence should recognise organisational constraints and justify conclusions with coherent reasoning and relevant evidence or examples. Where students propose approaches or recommendations, these should be realistic for the stated business context; and should demonstrate awareness of governance and responsibility, rather than focusing only on technical potential.

**For merit standard**, students are expected to explain how AI concepts and technologies support business decision-making and operational processes. They should make clear connections between AI capabilities and business functions such as customer insight, forecasting, risk analysis, process optimisation or service automation. Students should also analyse ethical risks and responsibilities by considering how AI deployment can affect different stakeholders, including customers, employees, suppliers, regulators and the public. Merit evidence is characterised by clearer reasoning, more specific examples, and stronger cause-and-effect links. For example students might explain how biased training data could lead to unfair customer outcomes or reputational damage. Merit work should show balanced awareness of both business value and risk.

**For pass standard**, students are expected to provide accurate descriptions of key AI concepts and technologies commonly used in business settings. They should use business-appropriate language to describe the roles of AI systems, for example prediction, classification, recommendation, automation or decision support. Students should outline how data, models and algorithms contribute to outputs. They should also describe reasonable use considerations associated with business AI, including issues such as privacy, bias, transparency and accountability, even where their discussion remains introductory. A Pass response is sufficient when it is factually correct, uses basic terminology accurately, and demonstrates awareness that ethical issues are relevant to business adoption and stakeholder trust.

## Learning aim B

**For distinction standard**, students are expected to evaluate the impact and suitability of AI applications in real-world contexts. They should make justified judgements that consider technical performance, ethical responsibility and professional project delivery together. Students should demonstrate a mature understanding that successful AI projects require more than building a model. They should consider the practical demands of implementation, for example integration into workflows, training users, managing change, monitoring performance and maintaining accountability. Distinction evidence should include balanced discussion of benefits and risks. It should result in well-justified recommendations, such as proposing appropriate safeguards, governance arrangements, or alternative solutions where AI use is not justified.

**For merit standard**, students are expected to explain the benefits and challenges of AI use in different contexts, to demonstrate awareness that sector requirements vary depending on risk, regulation and stakeholder impact. They should explain how planning and management decisions influence successful delivery. For example they might explain how data sourcing affects feasibility, how timelines and resources constrain technical ambition, and how risk management and governance support responsible deployment. Merit evidence is strengthened when students connect project management decisions to outcomes. For example they might explain how weak stakeholder engagement may lead to poor adoption, or how insufficient monitoring may allow performance to degrade over time.

**For pass standard**, students are expected to identify and describe real-world AI applications in business, society or specialist sectors. They should describe what AI systems are used for, whom it affects, and what value it is intended to deliver. Pass evidence is sufficient when it demonstrates a clear understanding of what the system does, and a basic awareness of project delivery considerations.

## Learning aim C

**For distinction standard,** students should evaluate the effectiveness and suitability of an AI business solution using evidence gathered through testing and refinement. They should make justified judgements about how well the solution addresses the defined business problem and meets business objectives. Students should evaluate factors such as performance, reliability, consistency, usability and limitations, considering the impact these may have on business operations and decision-making. They should also evaluate how data quality, algorithm selection and implementation decisions influenced outcomes. Evidence should demonstrate balanced evaluation, critical reflection and well-supported conclusions, including recommendations for further improvement where appropriate.

**For merit standard,** students should test an AI business solution using a range of realistic business scenarios, inputs or datasets and refine the solution based on the results obtained. They should identify issues such as inaccuracies, inconsistencies, bias, unexpected outputs or performance limitations and make appropriate improvements to data inputs, workflows, tools or algorithm settings. Students should explain how testing outcomes informed refinements and how those changes improved effectiveness. Evidence should demonstrate an iterative approach to development and include clear records of testing activities, changes made and resulting improvements.

**For pass standard,** students should prepare suitable data for use in an AI business solution and develop a solution that addresses a clearly defined business problem. Data preparation should include selecting and exploring appropriate datasets, identifying patterns, anomalies, missing values or potential bias and preparing data for use within the solution. The developed solution should apply appropriate AI tools, programming techniques or algorithms to generate outputs that support a business objective. Students should demonstrate that the solution functions as intended through basic testing and should describe the outputs produced in relation to the business problem. Evidence should confirm that students can apply appropriate AI techniques and produce a workable business solution.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 15: Big Data in AI
- Unit 18: AI Tools and Platforms
- Unit 19: AI for Health
- Unit 21: AI and Society
- Unit 22: AI Project Management


 

# Unit 12: Robotics and AI

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit introduces the integration of robotics and AI in systems that sense, interpret, decide and act within physical environments. It establishes the technical, ethical, safety and vocational considerations that shape responsible AI-enabled robotic systems.

## Unit introduction

Robotics and AI are increasingly integrated across modern industry and society, enabling machines to sense, decide and act within physical environments. From industrial automation, autonomous vehicles and smart manufacturing to healthcare robotics and service robots, AI-driven robotic systems are transforming productivity, safety and the nature of work.

In this unit you will be introduced to the principles that underpin robotics and AI. You will focus on how AI technologies enable robotic systems to interpret data, make decisions and perform tasks autonomously or semi autonomously. You will develop an understanding of robotic systems, AI models and algorithms, alongside the ethical and societal implications of deploying intelligent machines in real-world environments.

The unit takes a practical and vocational approach, requiring students to apply skills in data analysis, programming and AI model use to solve defined problems and to evaluate real-world robotic applications. It supports progression into engineering, automation, AI-enabled industries, apprenticeships or higher education.

## Learning aims

In this unit you will:

**A** Examine AI-enabled robotic systems

**B** Understand the applications for AI-enabled robotic systems

**C** Build and test an AI robotic system.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Examine AI-enabled robotic systems | **A1** Core concepts of robotics and AI<br>**A2** Principles of intelligent robotic systems<br>**A3** AI technologies and security considerations in robotics<br>**A4** Ethical considerations and societal impact | Report or presentation defining key robotics/AI concepts with a labelled system diagram. Summary of at least one AI technology used in robotics, including inputs/outputs and limitations. Sector use case write-up covering purpose, stakeholders, benefits and risks. Ethics and impact section addressing bias, privacy/surveillance, safety, accountability and job displacement, with realistic mitigations/governance. |
| **B** Understand the applications for AI-enabled robotic systems | **B1** Real-world applications of robotics and AI<br>**B2** Business, organisational and sector impact<br>**B3** Evaluation, impact and professional judgement | Comparison of two AI/robotics applications (purpose, stakeholders, inputs, autonomy, benefits/risks); analyse organisational/ethical impact with mitigations. |
| **C** Build and test an AI robotic system | **C1** Identifying and defining a robotics or AI problem<br>**C2** Data analysis for robotic systems<br>**C3** Programming and implementation of AI-enabled behaviour<br>**C4** Applying AI models and algorithms<br>**C5** Testing, evaluation and refinement | Demonstrate a complete AI solution lifecycle: problem brief and success criteria; dataset selection, profiling and preparation; annotated code and workflow notes; justified model/algorithm choice and settings; testing results with clear metrics; evaluation of limits, bias and safety; and documented refinements based on findings. |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Examine AI-enabled robotic systems

#### A1 Core concepts of robotics and AI

Students should develop a clear understanding of the relationship between robotics and artificial intelligence.

Teaching should cover:

- Robotics as the design and use of machines that can sense, process information and act within physical environments.
- Artificial intelligence as the set of techniques that enable systems to perceive information, make decisions and adapt behaviour.
- The distinction between traditional industrial robots that follow fixed programs and modern AI-enabled robots that use data and models to adjust behaviour.
- The roles of sensors (to gather data), actuators (to perform actions), control systems (to manage movement) and AI components (to support decision-making).
- The idea that intelligence in robotics emerges from the integration of multiple components, rather than from AI alone.
- Students should understand that robotic intelligence is engineered, bounded and constrained, rather than general or like that of humans.

#### A2 Principles of intelligent robotic systems

Students should explore the fundamental principles that govern robotic behaviour.

Teaching should include:

- Perception, including how sensors such as cameras, microphones or proximity devices collect data from the environment.
- Interpretation, including how AI models transform raw sensor data into usable information, such as recognising obstacles or identifying objects.
- Decision-making, where AI algorithms determine appropriate actions based on goals, rules and environmental data.
- Action and control, where robotic systems execute movements or responses using actuators.
- Feedback and adaptation, where systems adjust behaviour based on outcomes and environmental changes.

Students should recognise that robotic systems operate in dynamic, uncertain environments, which makes decision-making complex and error-prone.

### A3 AI technologies and security considerations in robotics

Teaching should ensure students understand the AI technologies commonly embedded in robotic systems.

Students should explore:

- Machine learning models used for perception tasks such as object recognition or navigation.
- Decision-making algorithms that support route planning, task selection or process optimisation.
- Pattern recognition techniques used to interpret sensor data.
- The role of data analysis in training, testing and refining robotic behaviour.
- The use of simulation environments and digital tools to develop and test robotic AI safely.
- Security considerations for AI-enabled robotic systems:
  - sensor data integrity
  - secure communication protocols.
- The emphasis should be on understanding purpose and behaviour, rather than mathematical derivation.

### A4 Ethical considerations and societal impact

Ethics should be a central theme across this learning aim.

Students should examine:

- Safety and reliability requirements in robotics, particularly where robots operate near people.
- Accountability when AI-enabled robots cause damage, injury or failure.
- Ethical challenges around autonomy, especially when robots make decisions without direct human control.
- Impact on employment, job roles and workforce skills.
- Privacy and surveillance concerns arising from robotic sensing and data collection.
- Public trust and acceptance of robots in social and industrial spaces.

Students should understand that ethical design and regulation are essential for responsible deployment.

## Learning aim B: Understand the applications for AI-enabled robotic systems
[EL-SRS]

### B1 Real-world applications of robotics and AI

Students should examine applied use cases such as:

- Industrial automation and smart manufacturing.
- Warehouse logistics and autonomous vehicles.
- Healthcare and assistive robotics.
- Service and customer-facing robots.
- Environmental monitoring, inspection and maintenance systems.

Students should understand the value proposition of each application.

### B2 Business, organisational and sector impact

Students should evaluate:

- Efficiency, productivity and safety gains.
- Cost, maintenance and reliability challenges.
- Workforce transformation and required reskilling.
- Regulatory and ethical constraints in different sectors.
- Comparison of the impact of AI/robotics in different contexts should be encouraged.

### B3 Evaluation, impact and professional judgement

Students should evaluate systems holistically.

Teaching should support students to:

- Assess technical effectiveness and limitations.
- Evaluate ethical and social impact.
- Balance innovation with responsibility.
- Make justified recommendations for improvement or alternative approaches.
- Compare at least two real-world applications, identifying contrasting benefits and risks.

Students should demonstrate mature, evidence-based judgement. Recommendations must be evidence-based and reference specific risks identified through evaluation.

## Learning aim C: Build and test an AI robotic system

### C1 Identifying and defining a robotics or AI problem

Students should practise selecting appropriate problems for robotic AI solutions.

Teaching should include:

- Identifying tasks suitable for automation or AI-assisted control.
- Defining clear objectives and measurable success criteria.
- Considering constraints such as safety, environment, cost or system capability.
- Justifying why AI is required rather than simple rule-based control.

Students should learn that not all problems benefit from AI.

### C2 Data analysis for robotic systems

Students should work with data relevant to robotics.

Teaching should cover:

- Types of data used in robotic systems, including sensor, positional or environmental data.
- Exploration of datasets to identify trends, noise or anomalies.
- Understanding data quality issues, such as missing values or unreliable sensors.
- Recognising how imperfect data affects decision-making and behaviour.

Students should understand that robotic systems must handle uncertain and noisy data.

### C3 Programming and implementation of AI-enabled behaviour

Students should apply programming concepts to implement robotic or AI workflows.

Teaching should focus on:

- Writing or configuring logic that links sensor input to actions.
- Using structured programming to control system flow and decision pathways.
- Understanding how software components interact with hardware or simulated environments.
- Documenting code or workflows clearly for debugging and maintenance.

The emphasis should be on clarity, correctness and understanding, rather than advanced code.

### C4 Applying AI models and algorithms

Students should apply AI techniques to support robotic decision-making.

Teaching should include:

- Selecting appropriate AI models or algorithms for specific tasks, such as navigation or recognition.
- Applying models to data to generate decisions or outputs.
- Interpreting outputs in relation to system goals and constraints.
- Comparing simple alternatives to understand algorithm suitability.

Students should understand that algorithm choice significantly influences system behaviour.

### C5 Testing, evaluation and refinement

Testing must be treated as essential, not optional.

Teaching should involve:

- Testing behaviour across different conditions or scenarios.
- Observing unintended or unsafe outcomes.
- Evaluating reliability, accuracy and responsiveness.
- Refining solutions iteratively to improve performance and safety.
- Recognising limitations that cannot be resolved within project constraints.

Evidence should demonstrate testing across at least three distinct scenarios or environmental conditions.

## Assessment criteria

### Learning aim A: Examine AI-enabled robotic systems

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe the purpose and key components of an AI-enabled robotic system.<br>**A.P2** Describe how AI enables robotic systems to sense, interpret and respond to their environment. | **A.M1** Explain how AI technologies and robotic components work together to support intelligent behaviour. | **A.D1** Evaluate the effectiveness and responsible use of AI-enabled robotic systems. |

### Learning aim B: Understand the applications for AI-enabled robotic systems

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Describe the use of AI-enabled robotic systems in business or specialist sectors. | **B.M2** Compare the benefits and limitations of AI-enabled robotic systems in different sectors. | **B.D2** Evaluate the impact and suitability of AI-enabled robotic systems for organisations and society. [SP-CT] |

### Learning aim C: Build and test an AI robotic system

| Pass | Merit | Distinction |
|---|---|---|
| **C.P4** Define a robotics or AI problem and prepare data for an AI robotic solution.<br>**C.P5** Develop an AI robotic solution using programming techniques and appropriate AI models or algorithms. | **C.M3** Test and refine an AI robotic solution to improve performance and reliability. | **C.D3** Evaluate the effectiveness, reliability and suitability of an AI robotic solution. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT √ |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS √ |
| MY – COP | EL – SRS * | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.P2, A.M1, A.D1)

Learning aim B: (B.P3, B.M2, B.D2)

Learning aim C: (C.P4, C.P5, C.M3, C.D3)

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

**Hardware**

- Robotics hardware or robotic kits suitable for educational use, or access to equivalent virtual or simulated robotics environments.

**Software and digital tools**

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

**Robotics platforms**

- Educational robotics toolkits.
- Programmable robotic devices.
- AI-enabled robotics platforms.
- Robotics simulators or virtual robotics environments where physical hardware is unavailable.

The resources selected should enable students to:

- Collect and process data from sensors.
- Implement programming logic.
- Apply AI models or algorithms.
- Test system behaviour under different conditions.
- Evaluate performance and safety.

**Data resources**

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
    - ethically sourced
    - appropriate for educational use
    - relevant to real-world contexts.



 

## Essential information for assessment decisions

### Learning aim A

**For distinction standard,** students should evaluate the effectiveness and responsible use of AI-enabled robotic systems in real-world contexts. They should make balanced and justified judgements about how successfully robotic systems meet their intended purpose while considering factors such as performance, reliability, safety, autonomy and system limitations. Students should evaluate the impact of design decisions, including the use of sensors, AI technologies and control systems, and consider ethical issues such as accountability, privacy, security and public trust. Evidence should demonstrate reasoned evaluation supported by relevant examples and clear conclusions.

**For merit standard,** students should explain how AI technologies and robotic components work together to support intelligent behaviour. They should explain how sensors collect environmental data, how AI models interpret information, how algorithms support decision-making and how actuators perform actions. Students should demonstrate understanding of how perception, interpretation, decision-making, control and feedback combine to enable robots to operate within dynamic environments. Evidence should include clear links between system components and the behaviours they enable.

**For pass standard,** students should demonstrate an understanding of the purpose and key components of AI-enabled robotic systems. They should describe the roles of components such as sensors, actuators, control systems and AI technologies within a robotic system. Students should also describe how AI enables robots to sense their environment, interpret incoming data and respond through actions or decisions. Evidence is likely to be descriptive and should demonstrate correct use of robotics and AI terminology. Students may support their descriptions with labelled diagrams, examples of robotic systems or simple real-world applications.

### Learning aim B

**For distinction standard**, students should evaluate the impact and suitability of AI-enabled robotic systems within organisational and societal contexts. They should make justified judgements about the effectiveness of robotic systems in meeting user, organisational and sector needs, considering factors such as productivity, safety, reliability, cost, ethical responsibility and regulatory requirements. Students should weigh the benefits and risks associated with implementation and evaluate the wider impact on stakeholders, employment, professional practice and society. Evidence should demonstrate balanced evaluation, supported conclusions and evidence-based recommendations for improvement, risk mitigation or alternative approaches.

**For merit standard**, students should compare the benefits and limitations of AI-enabled robotic systems used in different sectors. Comparisons should consider factors such as efficiency, productivity, safety, cost, maintenance requirements, workforce impacts, ethical challenges and regulatory constraints. Students should identify similarities and differences between applications and explain how sector requirements influence the way robotic systems are designed, deployed and managed. Evidence should demonstrate clear comparative analysis supported by relevant examples from at least two contrasting applications or sectors.

**For pass standard**, students should describe the use of AI-enabled robotic systems in business or specialist sectors, such as manufacturing, logistics, healthcare, service industries or environmental monitoring. They should identify the purpose of the systems, the tasks they perform and the benefits they provide.

## Learning aim C

**For distinction standard**, students should evaluate the effectiveness, reliability and suitability of an AI robotic solution using evidence gathered from testing and refinement activities. They should make justified judgements about how successfully the solution meets its objectives and success criteria, considering factors such as accuracy, responsiveness, reliability, safety and fitness for purpose. Students should evaluate the influence of data quality, programming decisions and AI model selection on the behaviour of the robotic system. They should identify limitations, risks and areas for improvement, supporting conclusions with testing evidence from multiple scenarios or operating conditions. Evidence should demonstrate critical reflection, balanced judgement and well-supported recommendations.

**For merit standard**, students should test an AI robotic solution under different conditions and refine the solution based on the outcomes obtained. Testing should consider factors such as accuracy, responsiveness, reliability, safety and consistency of behaviour. Students should identify issues such as errors, unexpected outputs, poor performance, unreliable sensor data or limitations in algorithm behaviour and make appropriate improvements to the data, programming logic, model configuration or system design. Evidence should demonstrate an iterative development process where testing is used to inform refinements and improve overall system performance. Testing records, observations and refinements should be clearly documented.

**For pass standard**, students should define a suitable robotics or AI problem by identifying objectives, success criteria and relevant constraints. They should prepare data for use within an AI robotic solution, including exploring and assessing data quality, identifying anomalies, noise or missing data and considering the suitability of the data for the intended purpose. Students should then develop an AI robotic solution using programming techniques and appropriate AI models or algorithms. The solution should demonstrate how inputs are processed to generate outputs or actions that address the defined problem. Evidence should demonstrate that students can apply data analysis, programming and AI techniques to create a functioning robotic solution and document their development process appropriately

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 8: Computer Vision Basics
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 15: Big Data in AI
- Unit 19: AI for Health
- Unit 22: AI Project Management

# Unit 13: AI Programming Techniques

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit develops structured programming techniques for AI systems, including data preparation, model execution, testing, refinement and workflow automation. It establishes how robust, maintainable and ethical AI code supports reliable solutions in realistic contexts.

## Unit introduction

Programming is a core skill underpinning the development, deployment and management of artificial intelligence systems. While introductory AI units focus on fundamental concepts and basic implementation, more advanced AI work requires students to develop robust programming techniques and structured workflows. It also requires the ability to integrate, test and refine AI models in realistic contexts.

This unit develops your understanding of advanced programming techniques used in AI, enabling you to write, adapt and manage programs that support data preparation, model execution, testing and evaluation. You will strengthen your ability to work with AI algorithms programmatically, develop efficient and maintainable code and consider ethical and professional responsibilities associated with implementing AI systems.

The unit emphasises hands-on programming practice, iterative development and evaluation. It also focuses on contextual awareness of how AI code is used in business, social and specialist domains. It supports progression into software development, data science, AI engineering, higher education or apprenticeships in digital and technical roles.

## Learning aims

In this unit you will:

**A** Examine AI programming and concepts

**B** Develop and test an AI program

**C** Evaluate an AI program.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Examine AI programming and concepts | **A1** AI concepts in a programming context<br>**A2** Techniques used in AI programming<br>**A3** Ethical considerations in AI programming<br>**A4** AI programming in modern contexts | Students submit a short report or slides explaining AI programming concepts and techniques, supported by annotated code or pseudocode and a simple workflow example from data preparation to model output. Students also discuss ethical risks and mitigations, using references. |
| **B** Develop and test an AI program | **B1** Advanced data handling for AI<br>**B2** Programming AI workflows<br>**B3** Implementing AI models and algorithms<br>**B4** Testing and evaluation through code<br>**B5** Refinement, optimisation and reflection | Students submit annotated code showing data handling and an AI workflow, with justified model choices. They include test results and metrics, evaluate limitations and risks, and record improvements made after testing. |
| **C** Evaluate an AI program | **C1** AI programming in real-world applications<br>**C2** Programming considerations across sectors<br>**C3** Planning and managing AI programming projects<br>**C4** Evaluation and professional judgement | |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Examine AI programming and concepts

#### A1 AI concepts in a programming context

Students will understand:

- How AI systems are implemented through code.
- The relationship between data, algorithms, models and program workflows.
- The difference between scripting simple AI tasks and building scalable, maintainable AI applications.
- Why understanding AI concepts is essential for effective programming and problem solving.

Students should recognise that AI programming involves managing both logic and uncertainty.

#### A2 Techniques used in AI programming

Students will explore:

- Programming techniques commonly used for efficient AI development, such as modular code, functions and reusable components.
- Techniques for validating, processing and handling data input and output in AI systems.
- Managing model execution workflows programmatically.
- Debugging and refining AI-related code.

The emphasis is on structured, readable and purposeful programming, rather than complexity for its own sake.

#### A3 Ethical considerations in AI programming

Students will examine:

- How bias or error can be introduced through poorly written code or data handling.
- Ethical responsibilities of programmers when implementing AI systems.
- Transparency, explainability and documentation of AI code.
- The importance of responsible coding practices in real-world deployments.

Students should understand that programmers play a central role in ethical AI outcomes.

### A4 AI programming in modern contexts

Students will explore:

- How AI code is developed, deployed and maintained in professional environments.
- Collaboration, version control and documentation practices.
- The role of programmers within AI development teams.

Students should also discuss ethical risks and mitigations, using real-world examples.

## Learning aim B: Develop and test an AI program

### B1 Advanced data handling for AI

Students will:

- Analyse datasets programmatically to prepare them for AI use.
- Apply techniques to clean, transform and structure data effectively.
- Identify bias, inconsistencies or limitations within data.
- Understand how data handling code influences AI outcomes.

Students should see data preparation as an integral part of AI programming.

### B2 Programming AI workflows

Students will:

- Develop structured programs that manage AI processes end-to-end.
- Integrate data input, model execution and output handling.
- Use functions, modules and logical structures effectively.
- Write modular, maintainable and well-documented code, suitable for real-world projects.

### B3 Implementing AI models and algorithms

Students will:

- Implement AI models or algorithms programmatically.
- Configure model parameters through code.
- Test different approaches and compare outputs using quantifiable metrics.
- Understand the impact of algorithm choice on results.

### B4 Testing and evaluation through code

Students will:

- Programmatically test AI systems using varied inputs.
- Capture, analyse and interpret outputs to identify errors or limitations.
- Automate basic evaluation steps where appropriate.
- Use testing results to refine code and model behaviour.

This reinforces professional development practice.

 

### B5 Refinement, optimisation and reflection

Students will:

- Refine AI programming solutions for clarity and reliability.
- Recognise limits of optimisation at Level 3.
- Reflect on trade-offs between performance, readability and ethical considerations.
- Justify final implementation decisions.

This includes test results and quantitative metrics, evaluating limitations and risks and recording improvements made after testing.

## **Learning aim C: Evaluate an AI program** [SP-CT]

### C1 AI programming in real-world applications

Students will explore:

- How AI programming supports business systems such as analytics, automation and decision support.
- Applications of AI software used in healthcare, engineering or public services.
- Constraints, standards and expectations placed on production-level AI code.

### C2 Programming considerations across sectors

Students will assess:

- Sector-specific requirements for reliability, compliance and transparency in AI systems.
- Differences between experimental code and production systems.
- Risks of deploying poorly engineered AI solutions.

### C3 Planning and managing AI programming projects

Students will explore:

- Defining programming objectives, tasks and success criteria.
- Managing time, resources and technical complexity.
- Testing, maintenance and documentation responsibilities.
- Collaboration and handover considerations within a project team.

### C4 Evaluation and professional judgement

Students will:

- Evaluate how effectively AI programming solutions meet real-world requirements.
- Consider ethical, organisational and user impacts of AI solutions.
- Make evidence-based recommendations for improvement or alternative approaches.

Evidence includes consideration of scope, identified stakeholders, success measures, risks, ethics, resourcing and a timeline. It should also include a feasibility evaluation with justified recommendations.

## Assessment criteria

### Learning aim A: Examine AI programming and concepts

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe the role of data, algorithms and program workflows in AI systems.<br>**A.P2** Describe programming techniques used to develop and maintain AI systems. | **A.M1** Explain how AI concepts and programming techniques influence the design and behaviour of AI systems. | **A.D1** Evaluate how programming approaches support the development of effective, reliable and maintainable AI systems. |

### Learning aim B: Develop and test an AI program

### Learning aim C: Evaluate an AI program

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Prepare and structure data for an AI programming solution.<br>**B.P4** Develop an AI program that implements models or algorithms to solve a defined problem. | **B.M2** Test and refine an AI program to improve performance and reliability. | **BC.D2** Evaluate the effectiveness and suitability of an AI program justifying recommendations for improvement. |
| **C.P5** Describe the strengths and limitations of the AI program.<br>**C.P6** Describe how the AI program meets the requirements of a defined problem. | **C.M3** Explain how testing results and performance metrics improved the AI program. [SP-PS] | |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT * |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS √ |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.P2, A.M1, A.D1)

Learning aims B and C: (B.P3, B.P4, C.P5, C.P6, B.M2, C.M3, BC.D2)

# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.
- Programming environments/IDEs, e.g. Python, Jupyter Notebook, Visual Studio Code, PyCharm Community Edition, Google Colab.
- Code editors.
- Testing and debugging tools.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should evaluate how programming approaches contribute to the development of effective, reliable and maintainable AI systems. They should make balanced judgements about the suitability of different programming techniques, considering factors such as code quality, maintainability, reusability, reliability and efficiency. Students should evaluate how programming decisions influence system performance and discuss the importance of professional practices such as documentation, testing and structured development. Evidence should demonstrate reasoned evaluation supported by relevant examples and justified conclusions.

**For merit standard**, students should explain how AI concepts and programming techniques influence the design and behaviour of AI systems. They should explain the relationship between data, algorithms, models and program workflows, and how programming techniques such as modular code, functions, reusable components and workflow management support AI development. Students should explain how programming decisions can affect system outputs, reliability and maintainability. Evidence should demonstrate clear links between AI concepts, programming approaches and system behaviour.

**For pass standard**, students should describe the role of data, algorithms and program workflows in AI systems. They should demonstrate an understanding of how data is processed through program workflows to generate outputs and how algorithms and models are implemented through code. Students should also describe programming techniques used to develop and maintain AI systems, including approaches such as modular programming, reusable code components, input and output handling, debugging and documentation. Evidence is likely to be descriptive and should demonstrate correct use of technical terminology and awareness of professional programming practices.

### Learning aims B and C

**For distinction standard**, students should evaluate the effectiveness and suitability of an AI programming solution using evidence gathered from testing, evaluation and refinement activities. They should make justified judgements about how well the solution addresses the defined problem and meets its intended objectives. Evaluation should consider factors such as reliability, performance, accuracy, maintainability, usability and fitness for purpose. Students should evaluate the impact of programming decisions, data preparation methods and model or algorithm selection on outcomes, supported by performance metrics and testing evidence. Evidence should demonstrate critical reflection, balanced judgement and justified recommendations for improvement.

**For merit standard**, students should test an AI program using a range of suitable inputs, datasets or scenarios and refine the solution based on the results obtained. They should identify errors, inconsistencies, limitations or performance issues and make appropriate improvements to the code, data handling processes, workflow design, model configuration or algorithm implementation. Students should explain how testing outcomes informed refinements and improved the reliability or performance of the solution. Evidence should demonstrate an iterative development process supported by testing records, code revisions and analysis of outcomes. They should also explain how testing results and performance metrics were used to improve the AI program. They should interpret evidence gathered from testing activities and explain how outputs, error rates, accuracy measures, performance indicators or other metrics reveal strengths and weaknesses within the solution. Students should explain how refinements to code structure, data handling processes, model configuration or algorithm implementation could improve performance, reliability or maintainability. Evidence should demonstrate a clear understanding of iterative development and how testing supports continuous improvement.

**For pass standard**, students should prepare and structure data for use within an AI program. This should include analysing, cleaning, transforming and organising data to ensure it is suitable for the intended task. They should then develop an AI program that implements appropriate models or algorithms to solve a defined problem. The program should manage inputs, processing and outputs through a structured workflow and generate results relevant to the stated objective. Evidence should demonstrate the use of appropriate programming techniques, including clear program structure, data handling and model implementation. Students should carry out basic testing to confirm that the solution functions as intended and produces valid outputs. They should describe the strengths and limitations of the AI program. Strengths may include factors such as accuracy, efficiency, usability, maintainability or successful achievement of intended outcomes, while limitations may relate to data quality, performance constraints, coding decisions or model behaviour. Students should also describe how the solution meets the requirements of the defined problem, referring to objectives, success criteria and expected outputs established during development. Evidence should be supported by examples from the student’s own solution and demonstrate an understanding of how programming decisions influence outcomes.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 7: Natural Language Processing (NLP)
- Unit 8: Computer Vision Basics
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 12: Robotics and Artificial Intelligence
- Unit 15: Big Data in AI
- Unit 18: AI Tools and Platforms
- Unit 22: AI Project Management


 

# Unit 14: Mathematical Foundations of Artificial Intelligence

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit introduces the mathematical concepts that underpin AI, including numerical representation, probability, uncertainty, optimisation and model evaluation. It establishes how mathematical assumptions influence AI performance, reliability, fairness and responsible use.

## Unit introduction

Mathematics provides the essential foundation that underpins AI systems, enabling machines to represent data, identify patterns, make predictions and optimise decisions. While students are not expected to become advanced mathematicians, a secure understanding of key mathematical concepts and techniques is essential to the fundamental understanding of this unit. Students will apply this knowledge to interpret how AI models behave, why algorithms make certain decisions and what limitations and ethical issues arise from those decisions.

In this unit, you will learn about the mathematical concepts and ideas that underpin AI, focusing on practical understanding and application rather than abstract theory. You will explore how mathematics supports data analysis, programming and the use of AI models. You will also learn how mathematical assumptions can influence AI system performance, reliability and fairness.

This unit provides a platform for students to understand the application of mathematical concepts to artificial intelligence and supports progression into higher education, apprenticeships or digitally focused employment. The contents of this unit complement practical programming and project-based learning across the qualification.

## Learning aims

In this unit you will:

**A** Understand mathematical foundations of AI

**B** Use mathematics to develop AI solutions

**C** Review and justify AI solutions using mathematics.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand mathematical foundations of AI | **A1** Mathematics as the foundation of AI<br>**A2** Numerical representation of data<br>**A3** Mathematical techniques that support AI systems<br>**A4** Uncertainty, probability and AI decision-making<br>**A5** Ethical implications of mathematical design choices | Students submit a short report or slides explaining key AI mathematics, supported by worked examples (vectors, matrices, probability), simple calculations and graphs, and an interpretation of model outputs. Students also discuss uncertainty, limitations and ethics, using referenced sources. |
| **B** Use mathematics to develop AI solutions | **B1** Data analysis using mathematical reasoning<br>**B2** Mathematical logic within programming<br>**B3** Mathematical foundations of AI models and algorithms<br>**B4** Mathematical evaluation of AI performance<br>**B5** Reflective use of mathematics in AI solutions | Students submit calculations and code showing data analysis, logic and model steps. Evidence includes worked examples, annotated scripts, model outputs and performance measures (e.g. accuracy/error). Students explain findings, limitations and how maths informed improvements and decisions. |
| **C** Review and justify AI solutions using mathematics. | **C1** Mathematical foundations in real-world AI applications<br>**C2** Societal and organisational impact of mathematical AI models<br>**C3** Mathematical considerations in AI project planning<br>**C4** Professional judgement and evaluation | Students submit a brief sector case study showing how mathematical models support AI decisions, plus a project proposal and plan. Evidence includes scope, success measures, risks and ethics, resourcing and timeline and a feasibility evaluation with justified recommendations. |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand mathematical foundations of AI

#### A1 Mathematics as the foundation of AI

Students should understand that artificial intelligence operates entirely through mathematical processes rather than human-like reasoning; and that every AI decision can be traced back to a numerical computation.

Teaching should cover:

- The role of mathematics as the language used by AI systems to represent information, patterns and relationships.
- How real-world phenomena such as behaviour, images, language or transactions are converted into numerical form so that machines can process them.
- The idea that AI systems do not understand meaning or intent, but manipulate numbers according to defined rules and calculations.
- Why mathematical abstraction is necessary to simplify complex real-world situations into computable models.
- The implications of simplification, including loss of nuance, context or human judgement.

Students should understand that every AI decision can be traced back to numerical computation.

#### A2 Numerical representation of data

Students should understand how data is represented mathematically in AI systems, and the impact of data representation on how AI systems interpret data.

Teaching should include:

- Use of numbers to represent features such as quantities, categories or signals.
- Representation of complex data types, such as images or text, through numerical encoding.
- The concept of vectors as ordered sets of numbers that represent individual data points.
- The role of matrices as a collection of vectors used to represent datasets or transformations.
- Why numerical scaling, normalisation or weighting is often required.

Students should understand that the way in which data is represented mathematically affects how AI systems interpret and process that data.

### A3 Mathematical techniques that support AI systems

Understand the mathematical techniques that enable AI systems and acknowledge the dynamic nature of these techniques.

Students should explore:

- Basic descriptive statistics, such as averages and measures of spread or dispersion, and their use in summarising data.
- Simple relationships and correlations used to detect patterns.
- Mathematical functions used to map inputs to outputs.
- The idea of optimisation, where AI systems attempt to minimise error or maximise performance.
- Conceptual understanding of iterative calculation, where models improve gradually through repeated adjustment.

Students should understand that AI systems are not static and rely on repeated numerical refinement.

### A4 Uncertainty, probability and AI decision-making

Students should understand why AI systems rarely give absolute answers.

Teaching should cover:

- The concept of uncertainty in real-world data.
- Why AI systems often produce probabilities, scores or confidence values rather than definitive answers.
- The impact of thresholds, for example those which decide whether the level of probability is ‘high enough’ to trigger an action.
- Why numerical uncertainty can lead to different decisions in different contexts.

Students should understand that AI decision-making is mathematically probabilistic, not certain.

### A5 Ethical implications of mathematical design choices

Students should understand how ethics arise from mathematical assumptions and the recognition that ethical AI depends on understanding the mathematics behind decisions.

Teaching should explore:

- How bias can enter AI systems through data selection and numerical weighting.
- Why optimisation of goals (such as maximising accuracy) may be a disadvantage to some groups.
- The ethical implications of using mathematical thresholds in high-stakes decisions.
- Transparency and explainability challenges caused by complex mathematical models.

- The responsibility of AI designers to understand and communicate mathematical limitations.

Students should recognise that ethical AI depends on understanding the mathematics behind decisions.

## Learning aim B: Use mathematics to develop AI solutions

### B1 Data analysis using mathematical reasoning

Students should understand the application of mathematical techniques to explore datasets used in AI systems.

Teaching should include:

- Using numerical summaries to understand data distributions.
- Identifying outliers and anomalies.
- Comparing datasets using numerical indicators.
- Understanding how statistical summaries influence AI model behaviour.
- Interpreting numerical outputs in relation to the context of the problem.

The emphasis should be on making sense of numbers, rather than formal calculation.

### B2 Mathematical logic within programming

Students should understand how mathematics is embedded within AI programs and recognise that code is an executable expression of mathematical logic.

Teaching should cover:

- Use of arithmetic and logical operations in AI code.
- How functions compute outputs from numerical inputs.
- Interpretation of variables, parameters and calculated values.
- Understanding how mathematical expressions control program behaviour.
- The link between formulas and algorithmic steps.

Students should recognise that code is an executable expression of mathematical logic.

### B3 Mathematical foundations of AI models and algorithms

Application of AI models, with awareness of their mathematical basis to interpret results.

Teaching should include:

- Understanding that models calculate outputs based on weighted numerical inputs.
- Interpreting how small numerical changes can produce different outcomes.
- Relating model parameters to real-world meaning where possible.
- Recognising that different algorithms apply different mathematical strategies.

Students should focus on interpreting results, rather than manipulating formulas.

### B4 Mathematical evaluation of AI performance

Students should understand how basic mathematics supports evaluation which is evidence-based and numerical.

Teaching should include:

- Comparing predicted values with actual outcomes.
- Interpreting error, accuracy or variation numerically.
- Understanding that performance metrics are numerical summaries, not guarantees.
- Recognising how evaluation results guide improvement decisions.

Students should understand that evaluation is evidence-based and numerical.

### B5 Reflective use of mathematics in AI solutions

Students should reflect on the role of maths in AI solutions.

Teaching should support students to:

- Recognise limitations revealed through numerical analysis.
- Decide whether a solution is sufficiently reliable.
- Identify when mathematical assumptions break down.
- Justify conclusions using numerical evidence.

## **Learning aim C: Review and justify AI solutions using mathematics** [IS-WC]

### C1 Mathematical foundations in real-world AI applications

Students should understand how mathematics underpins applied AI systems and recognise that different contexts demand different mathematical rigour.

Teaching should include:

- Business forecasting and numerical prediction models.
- Risk scoring and classification systems.
- Medical and scientific modelling.
- Public sector decision support tools.
- Sector-specific tolerance for error and uncertainty.

Students should recognise that different contexts demand different mathematical rigour.

### C2 Societal and organisational impact of mathematical AI models

Students should understand how mathematics and responsibility impact mathematical AI models.

- How mathematically derived decisions affect individuals and groups.
- Dangers of over-reliance on numerical predictions.
- Risks of assuming objectivity in mathematical outputs.
- The need for human oversight in high-impact contexts.

Students should understand that mathematics does not remove responsibility.

### C3 Mathematical considerations in AI project planning

Students should understand how mathematics affects project design, and how mathematical constraints shape the scope of an AI project.

Teaching should cover:

- Feasibility of modelling problems mathematically.
- Data quantity and quality requirements.
- Defining numerical success criteria.
- Planning for testing and validation.
- Iterative refinement based on numerical evidence.

Students should understand that mathematical constraints shape the scope of a project.

### C4 Professional judgement and evaluation

Making balanced evaluations.

Teaching should support students to:

- Evaluate AI solutions using mathematical evidence.
- Consider ethical risk alongside numerical performance.
- Balance efficiency with fairness and explainability.
- Make justified recommendations.

## Assessment criteria

### Learning aim A: Understand mathematical foundations of AI

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe how mathematics is used in AI systems.<br>**A.P2** Describe mathematical concepts used to represent data and make AI decisions. | **A.M1** Explain the role of mathematics in the development and use of AI systems. | **A.D1** Evaluate the role of mathematics in the development and use of AI systems. |

### Learning aim B: Use mathematics to develop AI solutions

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Use mathematical techniques to prepare and analyse data for an AI task. [EL-MOL]<br>**B.P4** Apply an AI model or algorithm to solve a defined problem. | **B.M2** Use mathematical evidence to test and improve an AI solution. | **B.D2** Evaluate an AI solution using mathematical evidence and testing results. |

### Learning aim C: Review and justify AI solutions using mathematics

| Pass | Merit | Distinction |
|---|---|---|
| **C.P5** Describe how mathematical models and techniques are used in AI systems. | **C.M3** Explain how mathematics influences AI outcomes. | **C.D3** Evaluate the role of mathematics in AI systems. |



 

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL √ | IS – WC * | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.P2, A.M1, A.D1)

Learning aim B: (B.P3, B.P4, B.M2, B.D2)

Learning aim C: (C.P5, C.M3, C.D3)



 

# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Graphing and visualisation tools.
- Mathematical modelling tools.
- Calculators.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software with charting and statistical capabilities
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for statistical analysis.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should evaluate the role of mathematics in AI systems and make justified judgements about how mathematical concepts and techniques contribute to the effectiveness, reliability and responsible use of AI. They should evaluate the strengths and limitations of mathematical approaches used to represent data, identify patterns and support decision-making. Students should consider how factors such as uncertainty, probability, optimisation and mathematical assumptions influence AI outcomes. They should also evaluate how mathematical design choices can affect fairness, transparency and trust in AI systems. Evidence should demonstrate balanced judgement, critical thinking and well-supported conclusions.

**For merit standard**, students should explain how mathematics influences AI decisions and outcomes. They should explain how numerical representations, statistical techniques, optimisation methods and probability are used within AI systems to process information and generate outputs. Students should explain why AI systems often produce confidence scores, probabilities or predictions rather than certain answers, and how mathematical assumptions can affect reliability and fairness. Evidence should demonstrate clear links between mathematical concepts and AI behaviour through the use of relevant examples.

**For pass standard**, students should describe how mathematics supports AI systems and how mathematical concepts are used within AI. They should describe how real-world information is represented numerically, including the use of data, vectors and matrices. Students should describe mathematical concepts and techniques used in AI, such as numerical representation, statistics, probability and optimisation and recognise that AI systems rely on mathematical calculations to identify patterns and generate outputs. Evidence is likely to be descriptive and should demonstrate correct use of technical terminology and a basic understanding of how AI systems use mathematics to make decisions.

### Learning aim B

**For distinction standard**, students should evaluate an AI solution using mathematical evidence gathered from testing and analysis. They should make justified judgements about how effectively the solution addresses the defined problem, considering factors such as accuracy, error, reliability and fitness for purpose. Students should evaluate the strengths and limitations of the solution by interpreting numerical results, performance measures and testing outcomes. They should consider the impact of data quality, mathematical assumptions and model behaviour on results and provide reasoned recommendations for improvement supported by evidence.


 

**For merit standard**, students should use mathematical evidence to test and improve an AI solution. They should interpret numerical outputs, performance measures and testing results to identify strengths, weaknesses and limitations within the solution. Students should use this evidence to make improvements to data preparation, model inputs, parameters or implementation approaches and explain how these changes improve the outcomes achieved. Evidence should demonstrate an iterative approach in which numerical evidence informs decision-making and refinement.

**For pass standard**, students should use mathematical techniques to prepare and analyse data for an AI task and apply an AI model or algorithm to solve a defined problem. Data analysis should include the use of appropriate numerical techniques to explore datasets, identify patterns, trends, outliers or anomalies, and interpret findings in relation to the problem being addressed. Students should then use an AI model or algorithm to generate outputs and demonstrate how mathematical logic, calculations or parameters contribute to the solution. Evidence should show that students can apply mathematics in a practical context, interpret outputs and present results clearly using appropriate numerical evidence.

## Learning aim C

**For distinction standard**, students should evaluate the role of mathematics in AI systems and make justified judgements about how mathematical models, techniques and performance measures support AI decision-making. They should evaluate the suitability and reliability of mathematical approaches used in different contexts and consider how factors such as uncertainty, probability, error, thresholds and optimisation influence outcomes. Students should evaluate the strengths and limitations of mathematical approaches alongside their impact on fairness, explainability and responsible AI use. Evidence should demonstrate balanced reasoning, supported conclusions and justified recommendations based on mathematical evidence.

**For merit standard**, students should explain how mathematics influences AI outcomes in real-world applications and projects. They should explain how mathematical models, data representation, performance measures and numerical constraints affect the behaviour, reliability and effectiveness of AI systems. Students should explain why different applications may tolerate different levels of error, uncertainty or risk and how mathematical evidence is used to support testing, validation and decision-making. Evidence should demonstrate clear links between mathematical decisions and AI outcomes using relevant examples.

**For pass standard**, students should describe how mathematical models and techniques are used within AI systems to support decisions, predictions and classifications in real-world contexts. They should describe how mathematics contributes to applications such as forecasting, risk scoring, decision support and pattern recognition. Students should also describe how mathematical considerations are used when planning, testing and evaluating AI projects, including the use of data requirements, success criteria, performance measures and validation activities. Evidence is likely to be descriptive and should demonstrate an understanding of how mathematics supports both the operation of AI systems and the development of AI projects.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 7: Natural Language Processing (NLP)
- Unit 8: Computer Vision Basics
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 13: AI Programming Techniques


 

# Unit 15: Big Data in AI

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit explores how big data enables AI systems to learn, scale and generate insight in real-world contexts. It establishes how data volume, variety, velocity, quality, governance and ethical responsibility affect AI system performance and suitability.

## Unit introduction

AI systems rely heavily on data to identify patterns, generate predictions and support decision-making. As organisations increasingly collect and process vast quantities of data, the role of big data has become central to the effectiveness, scalability and reliability of AI systems. Big data introduces both opportunities and challenges, for example issues such as data management, computational complexity, data quality, bias and ethical responsibility.

In this unit you will learn about the principles, technologies and practices associated with big data in AI. You will explore what distinguishes big data from traditional datasets; how large-scale data supports AI models and algorithms; and the ethical considerations associated with using extensive datasets. You will develop and apply practical skills in data analysis, programming and AI model use. You will evaluate the application of AI systems that depend on large-scale data across business, societal and specialist contexts.

The unit emphasises on practical and vocational relevance, including hands-on investigation and project-based learning that will support your progression into higher education, apprenticeships or employment in AI, data analytics, digital technologies and related fields.

## Learning aims

In this unit you will:

**A** Explore how big data supports AI

**B** Review big data AI systems and projects

**C** Use big data to solve AI problems.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Explore how big data supports AI | **A1** Defining big data in the context of AI<br>**A2** Relationship between big data and AI system performance<br>**A3** Big data infrastructure and principles<br>**A4** Big data across the AI lifecycle<br>**A5** Ethical considerations in big data and AI | Students submit a brief report explaining big data in AI, supported by a case example, an infrastructure overview (e.g. storage/processing), and a lifecycle map from collection to deployment. Students evaluate big data quality, bias and ethics, using referenced sources. |
| **B** Review big data AI systems and projects | **B1** Big data-driven AI in business contexts<br>**B2** Big data-driven AI in societal and specialist contexts<br>**B3** Impact of big data AI systems<br>**B4** Evaluation and professional judgement | |
| **C** Use big data to solve AI problems | **C1** Exploring large datasets<br>**C2** Data preparation at scale<br>**C3** Programming techniques for big data in AI<br>**C4** Applying AI models and algorithms to big data<br>**C5** Testing, evaluation and scalability | Students submit evidence of exploring a large dataset, preparing data at scale, and programming techniques to process it. They apply an AI model to big data, report performance and scalability results, and evaluate limitations, bias, and data quality, using referenced sources. |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Explore how big data supports AI

#### A1 Defining big data in the context of AI

Understand big data and its importance to modern AI systems.

- Big data and traditional data processing approaches.
- Common characteristics of big data, including:
  - volume: very large quantities of data
  - variety: different forms of data such as text, images, sensor readings or transaction logs
  - velocity: data generated and updated at high speed.
- AI models and large volumes of data, including:
  - identification of reliable patterns
  - improvement in predictive accuracy.
- Big data and AI performance, including:
  - prediction
  - recognition
  - personalisation.

#### A2 Relationship between big data and AI system performance

Understand how big data influences AI systems.

- The relationship between dataset size and model generalisation.
- Diverse data including:
  - reduction in overfitting
  - improving robustness.
- Limitations of big data including:
  - noise
  - inconsistency
  - redundancy.
- AI performance and bias results or error.
- Data relevance and quantity.

### A3 Big data infrastructure and principles

Understand how big data is managed at the conceptual level for AI purposes.

- The role of distributed storage and processing in handling large datasets.
- Scalability and AI systems.
- The concept of data pipelines and data flows.
- Batch and stream big data processing.
- The importance of reliability and data governance in large-scale systems.

### A4 Big data across the AI lifecycle

Understand how big data supports different stages of AI development.

- Data collection and sourcing.
- Data preparation and cleaning at scale.
- Training and testing AI models using large datasets.
- Monitoring deployed systems and identifying data drift.
- Updating AI models in real time.

### A5 Ethical considerations in big data and AI

Understand the ethical implications of big data and AI.

- Privacy and consent issues relating to large-scale data collection.
- Risks associated with combining datasets that reveal sensitive information.
- Bias and big data-driven AI, including:
    - ethical issues of merging large datasets
    - over representation of large datasets.
- Accountability challenges of big data AI systems, including:
    - decisions driven by large datasets
    - decisions driven by opaque datasets.
- Transparency and explainability challenges in big-data-driven AI systems.

## **Learning aim B: Review big data AI systems and projects** [IS-WC]

### B1 Big data-driven AI in business contexts

Exploration of real-world business applications, including:

- Business intelligence and analytics.
- Personalisation and recommendation systems.
- Demand forecasting and optimisation.
- Fraud detection and risk analysis.
- Customer behaviour modelling.

### B2 Big data-driven AI in societal and specialist contexts

Examine big data-driven AL applications beyond commercial business.

- Healthcare analytics and population-level modelling.
- Public sector decision support systems.
- Smart cities and infrastructure monitoring.
- Scientific and environmental data analysis.
- Sector-specific standards for reliability and ethical use.

### B3 Impact of big data AI systems

Evaluate the impact of big data AI systems from the perspective of multiple stakeholders.

- Benefits such as improved insight and scalability.
- Risks including privacy intrusion and discrimination.
- Organisational dependency on data-driven systems.
- Loss of human judgement when over-reliance occurs.

### B4 Evaluation and professional judgement

Understand the holistic evaluation of AI solutions based on big data.

- Assess technical effectiveness and limits.
- Weigh ethical and social implications.
- Consider cost, sustainability and organisational fit.
- Make reasoned recommendations supported by evidence.

## Learning aim C: Use big data to solve AI problems

### C1 Exploring large datasets

Application of data analysis techniques to large datasets.

- Loading and inspecting large datasets.
- Identifying structure, consistency and patterns.
- Detecting missing data, duplication or imbalance.
- Summarising large datasets using appropriate measures.
- Understanding sampling as a way to explore big data efficiently.

### C2 Data preparation at scale

Understand the challenges in the preparation of big data for AI use.

- Cleaning and filtering large datasets.
- Structuring data for model input.
- Handling unbalanced or skewed data distributions.
- Understanding the impact of preparation decisions on AI model behaviour.
- Trade-offs between completeness and practicality.

### C3 Programming techniques for big data in AI

Application of programming techniques to large datasets and AI models.

- Writing structured, readable programs that can handle volume and complexity.
- Managing data efficiently through code.
- Automating repetitive data processing tasks.
- Integrating data processing with AI model execution.
- Documenting workflows.

### C4 Applying AI models and algorithms to big data

- Selecting suitable models for large-scale data.
- Training or configuring models using big datasets.
- Understanding the impact of dataset size on outputs.
- Comparing results when models are used, including:
  - reduced datasets
  - full datasets.
- Interpreting outputs in relation to problem objectives.

### C5 Testing, evaluation and scalability

- Testing consistency and reliability of outputs.
- Evaluating performance across different data subsets.
- Identifying scalability limits and performance bottlenecks.
- Considering cost, efficiency and sustainability implications.
- Reflecting on whether big data use is justified in context.

## Assessment criteria

### Learning aim A: Explore how big data supports AI

### Learning aim B: Review big data AI systems and projects

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe how big data supports AI systems.<br>**A.P2** Describe issues associated with using big data in AI. | **A.M1** Explain how big data affects AI performance and reliability. | **A.D1** Evaluate the role of big data in AI systems. |
| **B.P3** Describe applications of big data-driven AI systems across different sectors. | **B.M2** Assess the benefits and challenges of using big data within AI systems. | **B.D2** Evaluate the impact and suitability of big data-driven AI systems, justifying recommendations for their use. |

### Learning aim C: Use big data to solve AI problems

| Pass | Merit | Distinction |
|---|---|---|
| **C.P4** Prepare a large dataset for an AI task.<br>**C.P5** Apply an AI model to solve a problem using big data. | **C.M3** Test and improve a big data AI solution. | **C.D3** Evaluate a big data AI solution. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC * | SP – CT √ |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |



 

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aims A and B: (A.P1, A.P2, B.P3, A.M1, B.M2, A.D1, B.D2)

Learning aim C: (C.P4, C.P5, C.M3, C.D3)

# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

 

## Essential information for assessment decisions

### Learning aims A and B

**For distinction standard**, students should evaluate the role of big data in AI systems and make justified judgements about how effectively large-scale data supports AI development and performance. They should evaluate both the benefits and limitations of big data, considering factors such as prediction accuracy, scalability, robustness, data quality and governance. Students should evaluate ethical issues including privacy, bias, transparency and accountability, assessing how these can affect the responsible use of AI. Evidence should demonstrate balanced reasoning, supported conclusions and consideration of both technical and ethical factors. Students should also evaluate the impact and suitability of big data-driven AI systems in different organisational, societal or specialist contexts. They should make justified judgements about how effectively big data supports AI applications, considering factors such as scalability, reliability, accuracy, responsiveness and organisational value. Students should evaluate both the benefits and limitations of using large-scale datasets, including issues relating to data quality, governance, privacy, bias, transparency and sustainability. They should consider the implications for different stakeholders and determine whether the use of big data is appropriate within the context being examined. Evidence should demonstrate balanced evaluation supported by relevant case-study evidence and result in well-justified recommendations for future use, improvement or alternative approaches.

**For merit standard**, students should explain how big data affects AI outcomes. They should explain how factors such as data volume, variety, velocity, quality and relevance influence the performance, reliability and behaviour of AI systems. Students should explain how large datasets can improve model accuracy and robustness but can also introduce challenges such as bias, inconsistency, redundancy and governance concerns. Evidence should demonstrate clear links between big data characteristics and AI outcomes using relevant examples. Students should assess the benefits and challenges of using big data within AI systems across different contexts. They should consider how characteristics such as volume, variety, velocity, quality and governance influence AI effectiveness, decision-making and operational performance. Students should assess opportunities including improved prediction, personalisation, automation, scalability and insight, alongside challenges such as privacy concerns, bias, data management complexity, cost and ethical considerations. Evidence should demonstrate reasoned assessment using examples from different sectors and should show clear links between big data characteristics and AI outcomes.

**For pass standard**, students should describe how big data is used in AI systems. They should identify key characteristics of big data, including volume, variety and velocity, and describe how large datasets support tasks such as prediction, recognition, personalisation and decision-making. Students should also describe challenges associated with using big data in AI, including issues relating to privacy, consent, bias, transparency, accountability and data quality. Evidence is likely to be descriptive and should demonstrate correct use of terminology and an understanding that the use of large-scale data can create both opportunities and risks for AI systems. Students should describe applications of big data-driven AI systems across different sectors, such as business intelligence, recommendation systems, forecasting, fraud detection, healthcare analytics, smart cities, environmental monitoring or scientific research. They should describe the purpose of the systems, how big data is used and the value it provides within the chosen context.

## Learning aim C

**For distinction standard**, students should evaluate a big data AI solution using evidence gathered from testing and performance reviews. They should make justified judgements about how effectively the solution addresses the defined problem, considering factors such as accuracy, reliability, scalability, efficiency and fitness for purpose. Students should evaluate the impact of dataset size, data quality, programming decisions and model selection on the outcomes produced. They should identify limitations, bottlenecks and risks associated with working at scale and provide reasoned recommendations for improvement. Evidence should demonstrate balanced evaluation supported by testing results and performance evidence.

**For merit standard**, students should test a big data AI solution and improve it based on the results obtained. They should identify issues such as poor performance, inconsistencies, bias, scalability limitations, inefficient processing or unreliable outputs and make appropriate refinements to the dataset, programming approach or AI model. Students should explain how testing findings informed improvements and how those changes affected performance and reliability. Evidence should demonstrate an iterative approach to development, supported by testing records and examples from their own work.

**For pass standard**, students should prepare a large dataset for an AI task by exploring, cleaning and structuring data so that it is suitable for analysis and model use. This should include identifying missing data, duplication, imbalance or other issues that may affect outcomes. Students should then apply an AI model to solve a defined problem using the prepared dataset and generate outputs relevant to the task. Evidence should demonstrate that students can work effectively with large datasets, use programming techniques to process data and apply AI models appropriately. Students should present and interpret outputs in relation to the problem being addressed.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 7: Natural Language Processing (NLP)
- Unit 8: Computer Vision Basics
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 13: AI Programming Techniques
- Unit 22: AI Project Management

# Unit 16: Work Experience

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

Students will gain practical experience, developing essential skills such as communication, empathy and professionalism. Students will reflect on their placement to inform future career choices and personal development.

## Unit introduction

Work experience is a vital part of preparing for a career. It provides students with the opportunity to gain insight into the realities of working in settings, especially where AI is established and used. As AI technologies are increasingly embedded within organisations, employers value individuals who can not only understand AI concepts but also apply them responsibly, communicate effectively and reflect on professional practice.

In this unit, you will gain insight into how AI is used in business, societal and specialist contexts, and to develop the professional behaviours expected in AI-related roles. You will engage in workplace or project-based activities that involve exploring AI systems, handling data, supporting technical tasks, or contributing to AI-enabled workflows.

Progression from this unit supports you in identifying future career pathways, whether in machine learning engineering, data scientists or AI and software engineering. It also helps you prepare for higher education or apprenticeships by building confidence, professional awareness and reflective practice. The experience gained will be instrumental in shaping your personal development plans and long-term goals.

## Learning aims

In this unit you will:

**A** Investigate opportunities for work-related learning in an AI-related role

**B** Carry out work experience in an appropriate setting in an AI-related role

**C** Reflect on work experience undertaken and its influence on own personal and professional development.

## Summary of unit

<table>
<tr><th>Learning aim</th><th>Key content areas</th><th>Assessment approach</th></tr>
<tr><td>A Investigate opportunities for work-related learning in an AI-related role</td><td>A1 AI-related work experience opportunities<br>A2 Benefits of AI-related work experience<br>A3 Preparing for an AI-related placement</td><td>Students will present a resource portfolio including details of research into a placement.</td></tr>
<tr><td>B Carry out work experience in an appropriate setting in an AI-related role</td><td>B1 Workplace induction<br>B2 Roles and tasks<br>B3 Working safely and responsibly</td><td rowspan="2">Students will complete a log of their roles and responsibilities when undertaking a work placement. Students will present a reflection for a personal/ professional development portfolio (PDP).</td></tr>
<tr><td>C Reflect on work experience undertaken and its influence on own personal and professional development</td><td>C1 Learning from work experience<br>C2 Using feedback and setting goals</td></tr>
</table>

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Investigate opportunities for work-related learning in an AI-related role [IS-T]

#### A1 AI-related work experience opportunities (a minimum of 40 hours in total is required)

- Work placements within organisations that develop, use or support AI systems.
- Virtual work experience and online industry projects focused on AI technologies.
- Voluntary, part-time or project-based activities involving data, AI tools or digital technologies.
- AI-related roles, such as AI Technician, Data Analyst, Junior Data Scientist, AI Software Developer, Machine Learning Engineer, AI Product Support Assistant, Business Intelligence Analyst, AI Research Assistant or AI Project Coordinator.
- Workplace sectors that use AI, including:
  - healthcare
  - business and finance
  - retail
  - manufacturing
  - education
  - government
  - logistics.

#### A2 Benefits of AI-related work experience

- Understanding the responsibilities of AI-related roles.
- Exploring how AI is used to solve real-world problems.
- Developing technical and professional skills relevant to AI careers.
- Understanding workplace expectations in AI environments.
- Building awareness of responsible and ethical AI practice.
- Networking with AI professionals and industry experts.
- Identifying future education, apprenticeship and employment pathways.
- Developing employability skills required in digital and technical roles.

### A3 Preparing for an AI-related placement

- Researching employers and organisations that use AI.
- Investigating workplace activities, systems and technologies.
- Identifying roles, responsibilities and required skills.
- Understanding workplace policies relating to:
  - confidentiality
  - data protection
  - responsible AI use
  - cybersecurity
  - acceptable use of technology.
- Understanding practical requirements such as:
  - working hours
  - attendance procedures
  - dress code
  - remote and hybrid working arrangements.
- Completing application and selection processes.
- Setting personal learning objectives linked to AI career aspirations.

## Learning aim B: Carry out work experience in an appropriate setting in an AI-related role

### B1 Workplace induction

- Organisational structure and the role of AI, data or digital technologies within the organisation.
- Overview of workplace systems, tools and technologies used in AI-related work.
- Roles and responsibilities within AI, data and technology teams.
- Health and safety procedures, including reporting hazards and safe working practices.
- Data protection, confidentiality, cybersecurity and acceptable use policies.
- Reporting absence, remote working protocols and professional communication expectations.
- Shadowing colleagues and observing workplace practices.

### B2 Roles and tasks

- Carrying out tasks within the boundaries of the role and level of responsibility.
- Supporting AI, data or digital workflows where appropriate.
- Following instructions and completing assigned tasks accurately.
- Communicating effectively with colleagues, supervisors and stakeholders.
- Demonstrating professional behaviours, including reliability, punctuality and accountability.

- Developing employability skills relevant to AI-related careers, including:
  - problem solving
  - teamwork
  - communication
  - digital literacy
  - self-management
  - attention to detail.
- Contributing to activities such as:
  - data collection or preparation
  - AI tool use
  - testing digital systems
  - generating reports
  - workflow documentation
  - supporting AI-enabled business processes.

**B3 Working safely and responsibly**

- Identifying workplace risks and following organisational procedures.
- Safe use of workplace technologies and digital systems.
- Protecting sensitive, personal and organisational data.
- Following data protection, confidentiality and cybersecurity requirements.
- Recognising the importance of responsible AI use and ethical professional behaviour.
- Maintaining professional conduct in face-to-face, remote and hybrid working environments.

## Learning aim C: Reflect on work experience undertaken and its influence on own personal and professional development

**C1 Learning from work experience**

- Reflection on knowledge gained:
  - knowledge of new vocational area or area of interest
  - confirming whether or not to work in a particular setting
  - to find out further information about a particular career or setting.
- Reflection on skills used and gained.

- Personal skills:
  - communication
  - problem solving
  - self-confidence
  - assertiveness
  - flexibility
  - positive approach.
- Work skills:
  - IT
  - teamwork
  - note taking
  - meeting attendance
  - punctuality
  - telephone manner
  - awareness of workplace setting and individuals
  - following instructions.
- Reflection on experiences gained:
  - identifying what went well and what could be improved
  - challenges faced
  - problems arising and how these were overcome or resolved.

**C2 Using feedback and setting goals**

- Feedback from teachers, supervisors, mentors, peers (e.g. identifying areas of positive and constructive feedback, highlighting areas for improvement).
- Setting goals for personal and professional development (e.g. short term, long term, personal, work-related goals, skills development, qualifications targeted).

## Assessment criteria

### Learning aim A: Investigate opportunities for work-related learning in an AI-related role

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe opportunities for work experience in AI-related roles.<br>**A.P2** Describe how to prepare for a work experience placement in an AI-related role. [MY—TPR] | **A.M1** Explain how work experience can support progression into AI-related careers. | **A.D1** Evaluate how work experience can support future career and development goals. |

### Learning aim B: Carry out work experience in an appropriate setting in an AI-related role

### Learning aim C: Reflect on work experience undertaken and its influence on own personal and professional development

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Complete a log of tasks carried out during an AI-related work placement, including roles and responsibilities.<br>**B.P4** Describe the skills, behaviours and responsibilities demonstrated during an AI-related work placement. | **B.M2** Explain the importance of working safely, professionally and responsibly during an AI-related work placement. | **B.D2** Evaluate the effectiveness of workplace practices and procedures experienced during the placement, making recommendations for improvement. |
| **C.P5** Review own strengths and areas for development identified during the work experience.<br>**C.P6** Describe actions to improve personal and professional skills based on feedback received. | **C.M3** Assess how work experience has contributed to personal and professional development. | **C.D3** Evaluate how work experience has influenced future career and progression plans. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS √ |
| MY – COP | EL – SRS | IS – T * | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |


 

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.P2, A.M1, A.D1)

Learning aims B and C: (B.P3, B.P4, C.P5, C.P6, B.M2, C.M3, B.D2, C.D3)

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to a work placement for a minimum of 40 hours.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should evaluate how work experience can support their future career and development goals. They should make reasoned judgements about how different work experience opportunities contribute to career progression, professional development and employability within AI-related fields. Students should evaluate the suitability of placements in relation to their own interests, strengths and aspirations, considering the technical, professional and personal skills developed through the experience. Evidence should demonstrate balanced evaluation, supported conclusions and realistic future development goals.

**For merit standard**, students should explain how work experience can support progression into AI-related careers. They should explain the benefits of engaging in workplace learning activities, including gaining insight into AI-related roles, developing technical and professional skills, understanding workplace expectations and building professional networks. Students should explain how work experience can help identify future education, training and employment opportunities. Evidence should demonstrate clear links between work experience activities and career development.

**For pass standard**, students should describe opportunities for work experience in AI-related roles and demonstrate an understanding of how to prepare for a placement. Opportunities may include workplace placements, virtual work experience, project-based activities, voluntary work or part-time roles involving AI, data or digital technologies. Students should describe potential AI-related roles and sectors in which AI is used. They should also describe how to prepare for a placement by researching employers, understanding workplace expectations, reviewing organisational policies and setting personal learning objectives. Evidence is likely to be descriptive and should demonstrate an awareness of the skills, knowledge and professional behaviours expected in AI-related workplaces.

## Learning aim B and C

**For distinction standard**, students should evaluate the effectiveness of workplace practices and procedures experienced during their AI-related work placement. They should make justified judgements about how well the organisation supported safe, professional and responsible working, considering areas such as induction processes, communication, data protection, cybersecurity, confidentiality, workplace supervision and professional conduct. Students should identify strengths and limitations in the procedures observed and provide realistic recommendations for improvement. Evidence should demonstrate balanced evaluation supported by examples from their placement experience.

Students should evaluate how their work experience has influenced their future career and progression plans. They should make reasoned judgements about the value of the placement in helping them understand AI-related roles, workplace expectations and future opportunities within the sector. Students should evaluate how the knowledge, skills and experiences gained have influenced their career aspirations and personal development objectives. They should draw together evidence from their placement activities, reflections and feedback to justify future development priorities, education pathways and career goals. Evidence should demonstrate balanced evaluation, supported conclusions and realistic progression plans.

**For merit standard**, students should explain the importance of working safely, professionally and responsibly during an AI-related work placement. They should explain why workplace procedures relating to health and safety, data protection, confidentiality, cybersecurity and responsible use of technology are important. Students should also explain how professional behaviours such as reliability, communication, punctuality, accountability and teamwork contribute to effective workplace performance. Evidence should demonstrate clear links between workplace expectations and successful professional practice.

Students should assess how work experience has contributed to their personal and professional development. They should assess the extent to which the placement helped develop knowledge, workplace awareness, technical understanding and employability skills such as communication, teamwork, problem solving, digital literacy and self-management. Students should refer to examples from their placement and consider how feedback, workplace experiences and responsibilities contributed to their development. Evidence should demonstrate thoughtful reflection and supported judgements about their progress.

**For pass standard**, students should complete a log of tasks undertaken during an AI-related work placement, including the roles, responsibilities and activities carried out. Activities may include supporting AI, data or digital workflows, collecting or preparing data, using AI tools, testing systems, generating reports or documenting processes. Students should also describe the skills, behaviours and responsibilities demonstrated during the placement, such as communication, teamwork, problem solving, digital literacy, self-management and attention to detail. Evidence should demonstrate participation in workplace activities and an understanding of the responsibilities associated with the role.

Students should review their strengths and areas for development identified during the work experience placement. They should reflect on the knowledge, skills and experiences gained and identify aspects of their performance that were effective, along with areas requiring further improvement. Students should also describe actions they could take to improve their personal and professional skills in response to feedback received from supervisors, mentors, teachers or colleagues. Evidence is likely to be reflective and should demonstrate an understanding of how feedback can be used to support future development.

## Links to other units

This unit links to all the other units in the specification.



 

# Unit 17: Creating Chatbots

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit introduces students to designing, developing, and evaluating chatbots for defined user needs.

## Unit introduction

Chatbots are one of the most widely adopted applications of AI, enabling organisations to automate communication, support users, and deliver services at scale. From customer service and online retail to healthcare triage, education and technical support, chatbots play a key role in modern digital interaction between humans and machines.

This unit introduces you to the concepts, algorithms and ethical considerations that underpin AI-driven chatbots, with a strong emphasis on practical design, development and evaluation. You will develop the skills required to analyse user requirements, process text data, apply AI models, and test conversational systems for accuracy, usefulness and ethical risk. You will also explore how chatbots are used in real-world business and specialist contexts, evaluating their impact on users, organisations and society.

The unit combines hands-on technical development, ethical reflection and vocational awareness. It supports progression into employment, apprenticeships or further study in AI, software development, digital services and related fields.

## Learning aims

In this unit you will:

**A** Understand chatbot technologies

**B** Develop and test chatbots

**C** Evaluate chatbot solutions and applications.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand chatbot technologies | **A1** Introduction to chatbots and conversational AI<br>**A2** Key algorithms and techniques used in chatbots<br>**A3** Chatbots in society and industry<br>**A4** Ethical considerations in chatbot design and deployment | Students submit a short report or slides explaining chatbot concepts and algorithms, with a sector use case example. Evidence includes a conversation flow; notes on natural language processing (NLP) methods; and an ethics section on bias, privacy and safeguarding, supported by references. |
| **B** Develop and test chatbots | **B1** Analysing chatbot requirements and user needs<br>**B2** Working with conversational text data<br>**B3** Programming chatbot logic and conversation flow<br>**B4** Applying AI models or chatbot development tools<br>**B5** Testing, evaluation and refinement of chatbots | Students submit a chatbot build with requirements analysis, cleaned training data, and an intent/entity set. Evidence includes annotated flow diagrams or code; tool/model outputs; a test plan with results; and documented improvements; plus brief evaluation of limitations, bias and safeguarding. |
| **C** Evaluate chatbot solutions and applications | **C1** Chatbots in business and specialist sectors<br>**C2** Impact of chatbot deployment<br>**C3** Evaluation and professional judgement | Students submit two sector case studies of chatbot use. Evidence includes user needs; success measures; deployment risks; safeguarding and ethics; resourcing and timeline; and a justified impact and feasibility evaluation, using references. |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand chatbot technologies

#### A1 Introduction to chatbots and conversational AI

Students should develop an understanding of what chatbots are and how they function within AI systems.

Teaching should include:

- Definition of a chatbot as a system designed to simulate conversation with users through text or voice.
- The purpose of chatbots, including information provision, task support and service automation.
- Differences between:
  - rule-based chatbots that follow predefined decision trees
  - AI-driven chatbots that use data and models to generate responses.
- How conversational AI differs from general artificial intelligence.
- Limitations of chatbots, including lack of true understanding, emotional awareness and common-sense reasoning.

Students should clearly understand that chatbots process language patterns rather than meaning in a human sense.

#### A2 Key algorithms and techniques used in chatbots

Students should understand the core techniques used to enable chatbots to respond to user input.

Teaching should cover:

- The process of analysing user input to detect intent.
- Recognition of keywords, patterns or features in text.
- Concept of intent classification and entity extraction at a conceptual level.
- Probabilistic decision-making in selecting responses.
- Comparison between:
  - deterministic responses (predefined answers)
  - probabilistic or model-based responses.

The focus should remain on what these techniques do and why they matter, rather than mathematical derivation.

### A3 Chatbots in society and industry

Students should examine the wider role of chatbots.

Teaching should explore:

- How chatbots are used in:
  - customer service and support
  - retail and e-commerce
  - education and training
  - healthcare and wellbeing support
  - internal organisational communication.
- Benefits such as availability, scalability and cost efficiency.
- Limitations, including user frustration, misunderstanding and accessibility issues.
- Risk of excluding or disadvantaging certain user groups.

Students should understand that chatbot suitability depends heavily on context, task and user expectations.

### A4 Ethical considerations in chatbot design and deployment

Ethics should be embedded throughout teaching.

Students should examine:

- Transparency and disclosure, including whether users know they are speaking to a chatbot.
- Privacy concerns when storing or processing conversational data.
- Bias arising from training data or response design.
- Risks of misinformation, manipulation or inappropriate advice.
- Over-reliance on chatbots in situations requiring human judgement.
- Organisational responsibility for monitoring and updating chatbot behaviour.

Students should understand that ethical chatbot design directly affects trust, safety and reputation.

## **Learning aim B: Develop and test chatbots** [SP-CT]

### B1 Analysing chatbot requirements and user needs

Students should develop the ability to plan chatbot functionality.

Teaching should include:

- Identifying the purpose of the chatbot.
- Defining target users and typical interaction scenarios.
- Identifying common user questions, intents or tasks.
- Defining chatbot scope and limitations.
- Setting measurable success criteria.

Students should understand that poor requirement analysis leads to ineffective chatbots.

**B2 Working with conversational text data**

Students should explore how text data underpins chatbots.

Teaching should include:

- Exploring example conversation datasets.
- Recognising variation in language use, spelling, tone and phrasing.
- Identifying ambiguity and uncertainty in user input.
- Understanding how data quality and diversity affect chatbot accuracy.

Students should understand that human language is unpredictable, making chatbot design challenging.

**B3 Programming chatbot logic and conversation flow**

Students should apply programming concepts to chatbot development.

Teaching should focus on:

- Structuring conversation flows logically.
- Mapping user input to responses or actions.
- Managing state and context where appropriate.
- Handling unknown or unsupported queries helpfully.
- Writing clear and maintainable code or configurations.

The emphasis should be on functional, readable and testable chatbot behaviour, rather than complexity.

**B4 Applying AI models or chatbot development tools**

Students should work with AI-enabled chatbot components.

Teaching should include:

- Using AI models or tools to support intent recognition or response selection.
- Configuring responses based on model outputs.
- Comparing rule-based and data-driven approaches.
- Understanding confidence levels or probabilities in response selection.

Students should develop awareness of model limitations and uncertainty.

### B5 Testing, evaluation and refinement of chatbots

Testing is a core professional skill in chatbot development.

Teaching should involve:

- Testing chatbot interactions using varied user inputs.
- Identifying incorrect, misleading or biased responses.
- Evaluating accuracy, consistency and usability.
- Refining chatbot logic, responses or data based on testing.
- Recognising when chatbot performance is unacceptable or unsafe.

Students should understand that testing is an ethical and quality-assurance requirement, not an optional activity.

## Learning aim C: Evaluate chatbot solutions and applications

### C1 Chatbots in business and specialist sectors

Students should explore how chatbots are applied in practice.

Teaching should include:

- Customer support and service automation.
- Retail assistants and product recommendation chatbots.
- Educational and training support chatbots.
- Healthcare triage and wellbeing chatbots.
- Internal organisational knowledge assistants.

Students should understand the purpose, benefits and likely limitations in each context.

### C2 Impact of chatbot deployment

Students should evaluate chatbot impact.

Teaching should support students to consider:

- Benefits such as increased responsiveness and cost reduction.
- Risks including loss of human contact and reduced service quality.
- Ethical and reputational risks.
- Accessibility and inclusivity considerations.

### C3 Evaluation and professional judgement

Students should make evidence-based evaluations.

Teaching should support students to:

- Evaluate chatbot effectiveness and limitations.
- Assess ethical responsibility and user impact.
- Make justified recommendations for improvement.
- Recognise contexts where chatbots may be unsuitable.

Students should demonstrate professional judgement rather than technical enthusiasm.

## Assessment criteria

### Learning aim A: Understand chatbot technologies

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe how chatbots are used to support users and organisations.<br>**A.P2** Describe technologies and techniques used in chatbot systems. | **A.M1** Explain how chatbot technologies and algorithms influence chatbot behaviour and performance. | **A.D1** Evaluate how chatbot technologies support effective chatbot solutions. |

### Learning aim B: Develop and test chatbots

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Design and build a chatbot for a defined purpose. [IS-T]<br>**B.P4** Configure chatbot responses using rules, data or AI tools. | **B.M2** Test and refine a chatbot to improve performance. | **B.D2** Evaluate a chatbot solution using testing evidence. |

### Learning aim C: Evaluate chatbot solutions and applications

| Pass | Merit | Distinction |
|---|---|---|
| **C.P5** Describe how chatbots are used in real-world contexts. | **C.M3** Explain how chatbot solutions meet user and organisational needs. | **C.D3** Evaluate the suitability and impact of chatbots solutions. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT * |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS | IS – T √ | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

* Signposted to indicate opportunities for development as a part of wider teaching and learning

√ Embedded in teaching, learning and assessment

blank Not embedded or signposted in unit

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.P2, A.M1, A.D1)

Learning aim B: (B.P3, B.P4, B.M2, B.D2)

Learning aim C: (C.P5, C.M3, C.D3)

# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Students should have access to at least one chatbot development environment, such as:

- Microsoft Copilot Studio
- Botpress
- Dialogflow
- IBM Watson Assistant
- Amazon Lex
- Rasa
- Voiceflow.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should evaluate how chatbot technologies support effective chatbot solutions in different contexts. They should make justified judgements about the suitability of different chatbot approaches, including rule-based and AI-driven systems, for meeting user and organisational needs. Students should evaluate the strengths and limitations of chatbot technologies, considering factors such as accuracy, reliability, user experience, scalability and maintainability. Evidence should demonstrate balanced evaluation supported by examples of chatbot applications and reasoned conclusions about their effectiveness.

**For merit standard**, students should explain how chatbot technologies and algorithms influence chatbot behaviour and performance. They should explain how chatbots process user input, identify intent and generate responses using techniques such as keyword recognition, pattern matching, intent classification, entity extraction and probabilistic response selection. Students should explain the differences between rule-based and AI-driven approaches and how these affect accuracy, flexibility and user interaction. Evidence should demonstrate clear links between chatbot technologies and the responses generated by chatbot systems.

**For pass standard**, students should describe how chatbots are used to support users and organisations and describe the technologies and techniques used within chatbot systems. They should describe the purpose of chatbots, such as providing information, supporting tasks and automating services and identify examples of chatbot use in areas such as customer service, retail, education, healthcare and organisational communication. Students should also describe key chatbot technologies and techniques, including rule-based and AI-driven approaches, natural language processing concepts, intent recognition, entity extraction and response generation. Evidence is likely to be descriptive and should demonstrate correct use of terminology and an understanding of how chatbots operate within conversational AI systems.

### Learning aim B

**For distinction standard**, students should evaluate a chatbot solution using evidence gathered through testing and refinement activities. They should make justified judgements about how effectively the chatbot meets its intended purpose and user requirements. Evaluation should consider factors such as accuracy, usability, reliability, consistency of responses and the ability of the chatbot to handle different user inputs appropriately. Students should identify strengths and limitations within the solution and use testing evidence to justify conclusions. Evidence should demonstrate critical reflection and include realistic recommendations for further improvement or situations where alternative solutions may be more appropriate.

**For merit standard**, students should test a chatbot using a range of realistic user interactions and refine it based on the results obtained. They should identify issues such as incorrect responses, unsupported queries, conversation flow weaknesses, usability issues or inconsistent behaviour. Students should make appropriate improvements to chatbot logic, responses, conversation flows, training data or AI tool configurations and explain how these refinements improved performance. Evidence should demonstrate an iterative development approach supported by testing records and examples of improvements made.

**For pass standard**, students should design and build a chatbot that addresses a defined purpose and user need. They should identify the chatbot's intended users, define its scope and create appropriate conversation flows. Students should configure chatbot responses using rules, conversational data or AI-enabled chatbot tools and demonstrate that the chatbot can respond appropriately to expected user inputs. Evidence should show how chatbot functionality was implemented and should include conversation flows, screenshots, configurations, code or other relevant development evidence. Students should demonstrate that the chatbot performs its intended function and produces suitable responses for its target users.

## Learning aim C

**For distinction standard**, students should evaluate the suitability and impact of chatbot solutions in real-world contexts. They should make justified judgements about how effectively chatbot solutions meet user needs and organisational objectives, considering factors such as usability, accuracy, reliability, accessibility and overall effectiveness. Students should evaluate both the benefits and limitations of chatbot deployment and consider the impact of the solution on users, organisations and service delivery. Evidence should include reasoned conclusions supported by examples, testing outcomes and relevant evidence from chatbot applications or projects. Where appropriate, students should make realistic recommendations for improvement or identify situations where alternative solutions may be more appropriate.

**For merit standard**, students should explain how chatbot solutions meet user and organisational needs through their design, functionality and performance. They should explain how user requirements influenced chatbot design decisions and how chatbot features, conversation flows, response strategies and testing outcomes contributed to the effectiveness of the solution. Students should explain both the benefits and challenges of chatbot use in different contexts and demonstrate an understanding of how refinement and testing support successful deployment. Evidence should demonstrate clear links between user requirements, chatbot design and achieved outcomes.

**For pass standard**, students should describe how chatbots are used in real-world contexts. This may include applications in customer service, retail, education, healthcare, wellbeing support or organisational communication. Students should describe the purpose of the chatbot, the intended users and the objectives it was designed to address.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 7: Natural Language Processing (NLP)
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 13: AI Programming Techniques
- Unit 16: Work Experience
- Unit 18: AI Tools and Platforms
- Unit 19: AI for Health

# Unit 18: AI Tools and Platforms

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit introduces students to selecting, configuring and using AI tools and platforms to solve defined problems. It also establishes how different factors can impact the overall usefulness of AI-enabled solutions.

## Unit introduction

AI is increasingly delivered through specialist tools, platforms and services rather than being developed entirely from scratch. Cloud-based AI environments, low-code platforms, application programming interfaces (APIs) and pre-trained models allow organisations to adopt AI rapidly and at scale. As a result, many AI-enabled roles require professionals who can select, configure, test and evaluate AI tools responsibly, rather than design algorithms from first principles.

This unit introduces you to the use of AI tools and platforms commonly found in business, societal and specialist contexts. You will explore how AI platforms support data analysis, model development, deployment and evaluation and will examine how platform choice influences system performance, usability, cost and ethical risk. Through practical activities, you will apply AI tools to solve defined problems. You will evaluate the suitability and impact of AI platform-based solutions.

The unit emphasises practical competence, informed decision-making and ethical responsibility, enabling you to understand not only how to use AI tools, but when and why they should be used. It supports progression to employment, apprenticeships, higher education or project-based AI roles by developing key skills relevant to AI practice.

## Learning aims

In this unit you will:

**A** Explore AI tools and platforms

**B** Evaluate AI tools and platforms in practice

**C** Use AI tools and platforms to solve problems.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Explore AI tools and platforms | **A1** AI delivered through tools and platforms<br>**A2** Types and categories of AI tools and platforms<br>**A3** Principles guiding AI tool and platform selection | Students submit a short report or presentation explaining AI tools and platforms supported by a sector use case example. Evidence should include an explanation of different categories of AI tools, platform capabilities, selection considerations and ethical factors. |
| **B** Evaluate AI tools and platforms in practice | **B1** Use of AI tools and platforms in business contexts<br>**B2** AI tools and platforms in societal and specialist contexts<br>**B3** Evaluation and professional judgement | |
| **C** Use AI tools and platforms to solve problems | **C1** Preparing and analysing data using AI tools<br>**C2** Programming and configuration within AI platforms<br>**C3** Applying AI models and algorithms through platforms<br>**C4** Testing, evaluation and refinement | Students submit an AI platforms build with requirements analysis, cleaned training data, and an intent/entity set. Evidence includes annotated flow diagrams or code; tool/model outputs; a test plan with results; documented improvements; and a brief evaluation of limitations, bias and safeguarding considerations. |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Explore AI tools and platforms

#### A1 AI delivered through tools and platforms

Students should understand how and why AI is delivered through tools and platforms rather than being built entirely from scratch.

Teaching should include:

- Definition of AI tools and platforms as software environments or services that provide AI capabilities, such as data analysis, modelling, prediction or automation.
- Differences between:
  - custom-built AI solutions
  - platform-based or service-based AI solutions.
- Reasons organisations use AI tools and platforms, including speed of development, scalability, cost efficiency and access to advanced capabilities.
- Limitations of platform-based AI, such as reduced transparency; dependency on vendors; privacy and security considerations; and limited customisation.

Students should understand that platforms abstract complexity but do not remove the need for understanding underlying AI behaviour.

#### A2 Types and categories of AI tools and platforms

Students should explore the broad categories of AI tools and platforms used in practice.

Teaching should cover:

- Data analysis and visualisation tools that support AI workflows.
- Machine learning platforms for training, testing and evaluating models.
- AI services for domains such as natural language processing, computer vision or recommendation systems.
- Low-code and no-code AI platforms that enable non-specialists to configure and deploy AI.
- Cloud-based AI services and integrated environments.

The focus should remain on capabilities and use cases, rather than branding or vendor comparison.

### A3 Principles guiding AI tool and platform selection

Students should understand the principles which organisations consider when choosing AI tools.

Teaching should include:

- Suitability for the intended task or problem.
- Data compatibility and integration with existing systems.
- Scalability and performance requirements.
- Cost, licensing and long-term sustainability.
- Ease of use and availability of support or documentation.
- Security, privacy and organisational policies.
- Bias arising from pre-trained models, training data or default settings.
- Flexibility versus control in configuration.

Students should recognise that AI platform selection is both a technical and organisational decision.

## **Learning aim B: Evaluate AI tools and platforms in practice** [SP-PS]

### B1 Use of AI tools and platforms in business contexts

Students should explore how AI platforms are used in business.

Teaching should include:

- Business analytics, forecasting and reporting.
- Customer interaction and support systems.
- Process automation and optimisation.
- Decision-support tools for managers and analysts.

Students should understand how AI platforms support organisational objectives.

### B2 AI tools and platforms in societal and specialist contexts

Students should examine AI platform use beyond commercial business.

Teaching should explore:

- Healthcare, education and public sector applications.
- Specialist technical or scientific environments.
- Responsible and context specific use of AI tools.
- Regulatory, safety or ethical requirements in high-impact sectors.

Students should recognise that context strongly affects acceptable AI tool use.

### B3 Evaluation and professional judgement

Students should evaluate AI tools and platforms holistically.

Teaching should support students to:

- Assess technical performance, accuracy and usability.
- Evaluate ethical responsibility, bias and risk.
- Consider organisational fit, cost effectiveness and sustainability.
- Make reasoned recommendations supported by evidence.

Students should demonstrate balanced and reflective judgement rather than uncritical adoption.

## **Learning aim C: Use AI tools and platforms to solve problems** [SP-PS]

### C1 Preparing and analysing data using AI tools

Students should apply data analysis skills using AI-enabled or data-analysis tools.

Teaching should include:

- Importing structured and unstructured data into AI tools or platforms.
- Exploring datasets to understand structure, scale, types and relevance to the problem.
- Identifying data quality issues such as missing values, duplication, inconsistencies, outliers or imbalance.
- Interpreting platform-generated summaries or visualisations.
- Reliability of AI tools and platforms in real world applications.
- Understanding the impact of data preparation on AI outputs.

Students should understand that AI tools amplify existing data quality issues.

### C2 Programming and configuration within AI platforms

Students should engage with programming or configuration tasks appropriate to Level 3.

Teaching should focus on:

- Using scripting, workflow configuration or platform interfaces to control AI processes.
- Managing inputs, processing steps and outputs.
- Understanding how code and configuration interact.
- Following structured, documented workflows.
- Evaluating the impact of configuration choices on performance, accuracy and reliability of AI solutions.
- Adhering to organisational or platform usage guidelines.

The emphasis should be on clarity, correctness and traceability, rather than advanced optimisation.

### C3 Applying AI models and algorithms through platforms

Students should apply AI models provided by platforms.

Teaching should include:

- Selecting appropriate models or services suitable for solving the problem.
- Configuring options and parameters.
- Running models against prepared data.
- Interpreting predictions, classifications or recommendations.
- Recognising uncertainty, confidence scores or probabilistic outputs.

Students should understand that models are tools, not decision-makers.

### C4 Testing, evaluation and refinement

Students should treat testing as a core professional skill.

Teaching should involve:

- Running tools using different datasets or scenarios.
- Comparing outputs to expected outcomes.
- Identifying bias, inconsistency or unexpected behaviour.
- Adjusting configuration, data selection or workflows.
- Evaluating AI model performance using appropriate metrics.
- Recording findings and decisions clearly.

Students should understand evaluation as essential for trustworthy AI use.


 

## Assessment criteria

### Learning aim A: Explore AI tools and platforms

### Learning aim B: Evaluate AI tools and platforms in practice

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe how AI tools and platforms are used to solve problems.<br>**A.P2** Describe different types of AI tools and platforms and their features. | **A.M1** Explain how AI tools and platforms support different AI tasks and requirements. | **AB.D1** Evaluate the suitability and impact of AI tools and platforms for different situations. |
| **B.P3** Describe how AI tools and platforms are used in real-world contexts. | **B.M2** Explain how AI tools and platforms meet user and organisational requirements. | |

### Learning aim C: Use AI tools and platforms to solve problems

| Pass | Merit | Distinction |
|---|---|---|
| **C.P4** Configure an AI tool or platform to solve a defined problem. [IS-T]<br>**C.P5** Use an AI tool or platform to generate and interpret outputs. | **C.M3** Test and refine an AI solution using platform features and feedback. | **C.D2** Evaluate an AI solution using evidence from testing and outputs. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS * |
| MY – COP | EL – SRS | IS – T √ | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aims A and B: (A.P1, A.P2, B.P3, A.M1, B.M2, AB.D1)

Learning aim C: (C.P4, C.P5, C.M3, C.D2)

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

**Hardware**

- Access to desktop or laptop computers capable of running modern web browsers.

**Software and digital tools**

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
    - word processing
    - presentation software.
- Web-based or installed AI tools, for example:
    - visual or no-code AI platforms
    - educational machine learning tools.
- Data handling tools, such as:
    - spreadsheet software
    - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

**Data resources**

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
    - ethically sourced
    - appropriate for educational use
    - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aims A and B

**For distinction standard**, students should evaluate the suitability and impact of AI tools and platforms in real-world contexts. They should make justified judgements about how effectively selected platforms meet user needs, organisational objectives and project requirements. Evaluation should consider factors such as usability, performance, reliability, scalability and fitness for purpose. Students should evaluate the strengths and limitations of AI platform-based solutions, considering organisational fit, sustainability, cost-effectiveness and practical constraints. Evidence should demonstrate balanced professional judgement supported by examples, project evidence and reasoned recommendations for future improvement or alternative approaches where appropriate.

**For merit standard**, students should explain how AI tools and platforms support different AI tasks and requirements. They should explain how various types of tools and platforms can be used for activities such as data analysis, machine learning, natural language processing, computer vision, automation and deployment. Students should explain how platform capabilities, performance requirements, integration needs and configuration options influence their suitability for particular applications. Evidence should demonstrate clear understanding of the relationship between platform features and the tasks they support.

Students should also explain the benefits and challenges associated with using AI platforms in different business, societal or specialist settings and demonstrate an understanding of how planning, tool selection and project management contribute to successful outcomes. Evidence should demonstrate clear links between user requirements, platform selection and project success.

**For pass standard**, students should describe how AI tools and platforms are used to solve problems. They should identify the purpose of AI tools and platforms and describe how they provide services such as data analysis, modelling, prediction, automation and decision support. Students should also describe different categories of AI tools and platforms, including data analysis tools, machine learning platforms, AI services, low-code and no-code solutions and cloud-based AI environments. Evidence is likely to be descriptive and should demonstrate correct use of terminology and an understanding of the role AI platforms play in enabling AI solutions.

### Learning aim C

**For distinction standard**, students should evaluate an AI solution created using AI tools or platforms, using evidence gathered through testing, output analysis and refinement activities. They should make justified judgements about how effectively the solution addresses the defined problem and meets user or organisational requirements. Evaluation should consider factors such as accuracy, reliability, usability, efficiency and fitness for purpose. Students should assess the strengths and limitations of the selected platform, identify factors that affected performance and provide realistic recommendations for improvement. Evidence should demonstrate professional judgement supported by testing results, outputs and examples from their own solution.

**For merit standard**, students should test an AI solution using a range of appropriate scenarios, datasets or user inputs and refine the solution based on the results obtained. They should identify issues such as inaccurate outputs, inconsistent behaviour, poor performance, bias, configuration weaknesses or workflow limitations. Students should use available platform features to improve the solution, such as adjusting settings, refining workflows, modifying configuration options or improving data preparation. They should explain how testing informed improvements and how refinements enhanced the overall performance and reliability of the solution. Evidence should demonstrate an iterative process of testing, review and improvement.

**For pass standard**, students should configure an AI tool or platform to solve a defined problem. This should include preparing and importing data where required, selecting appropriate platform features, configuring settings and following suitable workflows. Students should then use the AI tool or platform to generate outputs and interpret the results produced. Outputs may include predictions, classifications, recommendations, visualisations or automated decisions depending on the platform used. Evidence should demonstrate that students can operate an AI platform correctly, apply suitable features to a practical task and interpret the outputs in relation to the problem being addressed.

## Links to other units

This unit links to all the other units in the specification.


 

# Unit 19: AI for Health

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit introduces students to how AI is used responsibly in health, healthcare and wellbeing contexts.

## Unit introduction

AI is increasingly used within healthcare and health-related sectors to support diagnosis, treatment planning, operational efficiency and patient care. AI systems can analyse complex datasets, identify patterns and generate insights that support clinical and organisational decision-making. However, the application of AI in healthcare also raises significant ethical, safety and accountability considerations. This is due to the sensitive nature of health data and the potential impact on patient outcomes.

This unit introduces you to the use of AI in health and healthcare related contexts, providing a balance of conceptual understanding, practical skill development and critical evaluation. You will explore key AI technologies used in health settings; apply practical skills in data analysis and AI models using health-related scenarios; and evaluate real-world applications of AI across healthcare, public health and specialist health-focused sectors.

The unit supports progression to higher education, apprenticeships or careers in healthcare technology, data analysis, digital health, biomedical science or applied artificial intelligence.

## Learning aims

In this unit you will:

**A** Explore AI in healthcare

**B** Evaluate AI applications used in healthcare

**C** Use AI to solve health-related problems.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Explore AI in healthcare | **A1** AI in health and healthcare contexts<br>**A2** AI technologies used in health settings<br>**A3** Health data and AI | Students submit a short report or slides explaining AI in healthcare, supported by a case study and a system diagram. Evidence includes health data considerations; model outputs and limitations; and an ethics section on privacy, bias, safety and accountability, with references. |
| **B** Evaluate AI applications used in healthcare | **B1** AI applications in healthcare and wellbeing<br>**B2** Societal and organisational impact<br>**B3** Project-based AI for health activities<br>**B4** Evaluation and professional judgement | |
| **C** Use AI to solve health-related problems | **C1** Analysing health-related or simulated datasets<br>**C2** Programming and tool-based AI tasks in health contexts<br>**C3** Applying AI models and algorithms to health-related problems<br>**C4** Testing, evaluation and risk awareness | Students submit evidence of analysing a health or simulated dataset, preparing data, and using code or tools to apply an AI model. They include test results and metrics; evaluate limitations, bias and safety risks; and document refinements. |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Explore AI in healthcare

#### A1 AI in health and healthcare contexts

Students should develop an understanding of what AI means within health-related environments.

Teaching should include:

- AI as systems that analyse large volumes of health-related data to identify patterns, generate insights or support decision-making.
- The distinction between:
  - clinical AI (supporting diagnosis or treatment planning)
  - operational AI (supporting scheduling, resource use or workflow)
  - preventive and public health AI (population-level analysis).
- The principle that AI supports healthcare professionals rather than replacing them.
- The limitations of AI when dealing with complex, individual human cases.

Students should understand that clinical responsibility always remains with qualified professionals.

#### A2 AI technologies used in health settings

Students should explore the technologies commonly associated with AI for health.

Teaching should cover:

- Data-driven AI systems that analyse patient or population data.
- Image-based AI systems used to support medical imaging interpretation.
- Text-based AI systems for analysing health records or supporting communication.
- Predictive systems used to assess risk, demand or outcomes.
- Decision-support tools that provide recommendations rather than decisions.

The emphasis should be on understanding capability and purpose, rather than clinical operation.

#### A3 Health data and artificial intelligence

Students should understand the nature and challenges of data used in health-related AI.

Teaching should include:

- Types of health-related data, such as demographic data, clinical measurements, imaging data or self-reported wellbeing data.
- Importance of data quality, accuracy, completeness and timeliness.

- Impact of missing, biased or unrepresentative data on AI outcomes.
- Differences between individual-level and population-level data.
- The sensitivity of health data and its implications for AI use.

Students should understand that health data carries higher ethical and legal protection.

## Learning aim B: Evaluate AI applications used in healthcare

### B1 AI applications in healthcare and wellbeing

Students should explore real-world applications.

Teaching should include:

- AI used in healthcare service support and administration.
- Population-level public health analysis.
- Assistive and digital health tools.
- Remote monitoring and health-tracking technologies.
- Decision-support systems used by professionals.

Students should distinguish between clinical and non-clinical impact.

### B2 Societal and organisational impact

Students should evaluate wider implications.

Teaching should explore:

- Improvements in efficiency and access.
- Risk of inequality or digital exclusion.
- Trust in AI-supported healthcare decisions.
- Organisational reliance on automated systems.
- Legal and reputational considerations.

Students should adopt multi-stakeholder perspectives.

### B3 Project-based AI for health activities

Students should apply project approaches.

Teaching should include:

- Planning objectives and success criteria.
- Managing ethical constraints.
- Documenting development and evaluation.
- Reviewing outcomes and limitations.
- Presenting findings appropriately.

Projects must be safe, ethical and appropriately scoped.


 

#### B4 Evaluation and professional judgement

Students should make balanced judgements.

Teaching should support students to:

- Evaluate technical effectiveness and limitations.
- Weigh benefits against ethical risks.
- Consider patient, professional and organisational perspectives.
- Recommend safeguards, constraints or alternatives.
- Recognise when AI use is inappropriate.

Professional judgement is central to this aim.

### Learning aim C: Use AI to solve health-related problems

#### C1 Analysing health-related or simulated datasets

Students should apply data analysis skills using health-appropriate datasets.

Teaching should include:

- Exploring datasets to identify trends, distributions and anomalies.
- Recognising incomplete or noisy data.
- Identifying bias or imbalance in data representation.
- Understanding how dataset limitations affect AI interpretations.
- Relating findings back to defined, non-clinical objectives.

Students should focus on insight, rather than diagnosis.

#### C2 Programming and tool-based AI tasks in health contexts

Students should apply programming or AI tools responsibly.

Teaching should include:

- Using code, scripts or AI tools to process and analyse data.
- Following safe and documented workflows.
- Applying structured programming logic for repeatability.
- Understanding how small changes affect outputs.
- Ensuring transparency and traceability of steps.

The emphasis should be on correctness, clarity and reproducibility, rather than complexity.

### C3 Applying AI models and algorithms to health-related problems

Students should use AI models appropriately.

Teaching should cover:

- Applying models to detect patterns or predict categories.
- Interpreting outputs in relation to project objectives.
- Understanding probabilistic outputs and confidence levels.
- Avoiding over-interpretation of results.
- Recognising limitations and uncertainty.

Students must avoid treating models as authoritative.

### C4 Testing, evaluation and risk awareness

Testing and evaluation are especially critical in health contexts.

Teaching should involve:

- Testing outputs against known or expected patterns.
- Evaluating accuracy, consistency and limitations.
- Identifying potential bias or ethical risk.
- Reflecting on appropriateness of AI use.
- Documenting findings clearly.

Students should understand that evaluation protects patient safety.

## Assessment criteria

### Learning aim A: Explore AI in healthcare

### Learning aim B: Evaluate AI applications used in healthcare

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe how AI is used in health-related contexts.<br>**A.P2** Describe AI technologies and health data used in AI systems. | **A.M1** Explain how AI technologies support health-related decision making and services. | **AB.D1** Evaluate the suitability, benefits and limitations of AI applications in healthcare. |
| **B.P3** Describe how AI is used in health-related contexts. | **B.M2** Explain how AI applications support healthcare services and users. | |

### Learning aim C: Use AI to solve health-related problems

| Pass | Merit | Distinction |
|---|---|---|
| **C.P4** Prepare health-related data for an AI task.<br>**C.P5** Use AI tools, models or algorithms to solve a health-related problem. | **C.M3** Test and improve an AI solution using evaluation findings. | **C.D2** Evaluate the effectiveness of an AI solution used to address a health-related problem. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

 

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aims A and B: (A.P1, A.P2, B.P3. A.M1, B.M2, AB.D1)

Learning aim C: (C.P4, C.P5, C.M3, C.D2)

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

**Hardware**

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

**Software and digital tools**

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.


 

## Essential information for assessment decisions

### Learning aims A and B

**For distinction standard**, students should evaluate the suitability, benefits and limitations of AI applications used in healthcare contexts. They should make justified judgements about how effectively AI technologies support healthcare services, wellbeing outcomes and organisational objectives. Students should evaluate the strengths and limitations of AI applications, considering factors such as effectiveness, reliability, data quality, usability, safety and ethical responsibility. They should consider the needs of different stakeholders, including patients, healthcare professionals and organisations and evaluate the wider impact of AI on healthcare delivery, access to services and decision-making. Evidence should demonstrate balanced evaluation, supported conclusions and reasoned recommendations for the appropriate use of AI in healthcare settings.

**For merit standard**, students should explain how AI technologies and applications support healthcare services and users. They should explain how technologies such as data-driven AI systems, image-based AI, text-based AI, predictive systems and decision-support tools are used to analyse information and generate insights. Students should explain how AI applications can support healthcare delivery, wellbeing outcomes and organisational objectives, considering factors such as efficiency, decision-making, accessibility and service improvement. They should also explain how health data quality, completeness and representativeness can influence the reliability and effectiveness of AI applications. Evidence should demonstrate clear links between AI technologies, health data, healthcare applications and the outcomes they support.

**For pass standard**, students should describe how AI is used in health-related contexts and describe the technologies, health data and applications used within AI systems. They should identify how AI supports activities such as diagnosis support, treatment planning, operational efficiency, public health analysis and wellbeing services. Students should describe common AI technologies used in health settings, including predictive systems, image-based AI, text-based AI and decision-support tools. They should also describe how AI applications are used in healthcare services, wellbeing support, public health analysis, remote monitoring, assistive technologies and decision-support systems. Evidence is likely to be descriptive and should demonstrate correct use of terminology and an understanding of how AI technologies, health data and applications support healthcare services and users.

### Learning aim C

**For distinction standard**, students should evaluate the suitability and impact of AI applications in health-related contexts and make justified judgements about their use within healthcare, wellbeing and specialist health settings. They should evaluate how effectively AI applications address user, patient, professional and organisational needs while considering factors such as reliability, effectiveness, usability and limitations. Students should consider the wider impact of AI on healthcare delivery, service efficiency, access to support and organisational decision-making. Evidence should demonstrate balanced evaluation supported by relevant examples and should include reasoned recommendations, safeguards or alternative approaches where appropriate.

**For merit standard**, students should explain how AI applications support healthcare services and users. They should explain how AI can improve efficiency, support decision-making, assist service delivery and contribute to health and wellbeing outcomes. Students should explain both the benefits and challenges associated with AI use, considering the needs of different stakeholders and the practical factors that influence successful implementation. Evidence should demonstrate clear links between AI applications, intended outcomes and the needs of users and organisations.

**For pass standard**, students should describe how AI is used in health-related contexts and describe how an AI project was planned and evaluated in a health-related context. This may include applications used in healthcare services, wellbeing support, public health analysis, remote monitoring, assistive technologies or decision-support systems.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 7: Natural Language Processing (NLP)
- Unit 8: Computer Vision Basics
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 15: Big Data in AI
- Unit 16: Work Experience
- Unit 18: AI Tools and Platforms


 

# Unit 20: Cybersecurity and Artificial Intelligence

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit explores how AI is used to detect, prevent and respond to cyber threats, and how attackers may also exploit AI to increase risk. Students apply practical data and AI techniques to security problems and evaluate effectiveness, limitations and ethical responsibilities.

## Unit introduction

Cybersecurity is a major concern for organisations, governments and individuals as digital systems become increasingly interconnected, data driven and dependent on timely threat detection and response. AI now plays an important role in strengthening cybersecurity through monitoring, pattern recognition and automated support. However it also creates new risks, vulnerabilities and ethical challenges. Understanding both the benefits and limitations of AI in cybersecurity is therefore essential for future digital professionals.

In this unit, you will learn how AI is applied in cybersecurity contexts to support defensive activity such as threat detection, analysis and response. You will explore key concepts, techniques and ethical issues, and develop practical skills in data analysis, programming or tool-based workflows. You will also learn about the testing and evaluation of AI-enabled cybersecurity systems.

This unit will help you progress to further study, apprenticeships or employment in cybersecurity, AI, computing and related digital sectors. The knowledge and skills developed will also support wider understanding of responsible technology use, risk awareness and professional judgement in real-world settings.

## Learning aims

In this unit you will:

**A** Understand AI in cybersecurity

**B** Review AI cybersecurity solutions

**C** Apply AI to cybersecurity problems.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand AI in cybersecurity | **A1** Cybersecurity fundamentals in an AI context<br>**A2** AI in cybersecurity<br>**A3** Algorithms and techniques used in AI-based cybersecurity<br>**A4** Adversarial behaviour and AI limitations | Students submit a brief report or slides explaining AI in cybersecurity, supported by an attack/defence case example and a simple workflow diagram. Evidence includes algorithm notes (e.g. anomaly detection); adversarial limitations; and an ethics section on privacy, accountability and harm, with references. |
| **B** Review AI cybersecurity solutions | **B1** AI-enabled cybersecurity in business contexts<br>**B2** Societal and specialist applications<br>**B3** Evaluation and professional judgement | |
| **C** Apply AI to cybersecurity problems | **C1** Analysing cybersecurity-related data<br>**C2** Programming and tool-based security workflows<br>**C3** Applying AI models in cybersecurity contexts<br>**C4** Testing, evaluation and resilience | Students submit cybersecurity dataset analysis, documented data preparation, and code/tool outputs from an AI security workflow. Evidence includes model choice and outputs; a test plan with metrics (e.g. false positives); resilience checks; and an evaluation of limitations, adversarial risk and ethics. |


 

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand AI in cybersecurity

#### A1 Cybersecurity fundamentals in an AI context

Students should develop a clear understanding of cybersecurity as the protection of systems, networks, data and services from digital threats.

- What is meant by cybersecurity, including confidentiality, integrity and availability.
- Why cybersecurity is essential in modern data-driven and connected systems.
- The role of AI in supporting cybersecurity goals.
- Differences between:
  - traditional rule-based security systems
  - AI-enabled security systems that adapt to patterns.
- Limitations of security systems, including false positives, false negatives and evolving threats.

Students should understand that no system is perfectly secure, even with AI.

#### A2 AI in cybersecurity

Students should understand how AI is applied within cybersecurity.

- Use of AI for monitoring large volumes of system or network activity.
- Pattern recognition to identify normal versus malicious behaviour.
- Automated alerting and prioritisation of security threats.
- AI-supported response and mitigation actions.
- The role of AI as decision-support rather than autonomous authority.

Students should recognise the difference between detection, analysis and response.

#### A3 Algorithms and techniques used in AI-based cybersecurity

Students should explore the concepts behind the main techniques used.

- Anomaly detection to identify unusual behaviour.
- Classification techniques that label activity as benign or malicious.
- Behaviour-based detection versus signature-based detection.
- Use of probabilistic outputs and confidence scores.
- The importance of continuous training and updating.

The focus should be on what these techniques do and why they are appropriate, rather than on their mathematical derivation.

### A4 Adversarial behaviour and AI limitations

Students should understand that cybersecurity is inherently adversarial.

- How attackers adapt to detection systems.
- Use of AI by attackers to automate phishing, malware generation or avoidance techniques.
- Concept of adversarial attacks against AI models.
- Why AI systems must be continuously monitored, tested and refined.
- Risks of over-reliance on automated security decisions.

Students should understand that AI systems can themselves be attacked.

## **Learning aim B: Review AI cybersecurity solutions** [IS-WC]

### B1 AI-enabled cybersecurity in business contexts

Students should explore real-world business use.

- Enterprise monitoring and intrusion detection.
- Fraud detection and risk analysis systems.
- Protection of customer data and digital assets.
- Security operations centres and alert management.

Students should understand business priorities such as risk, cost and impact.

### B2 Societal and specialist applications

Students should explore wider contexts.

- Security of public services and digital infrastructure.
- AI-enabled protection of critical systems.
- Ethical debates around large-scale surveillance.
- National or sector-specific regulatory considerations.

Students should adopt broad societal perspectives.

### B3 Evaluation and professional judgement

Students should demonstrate mature judgement.

- Evaluate technical effectiveness and limitations.
- Balance security benefits against ethical and legal risks.
- Consider stakeholder impact.
- Propose safeguards, oversight and governance.
- Recognise contexts where AI may be inappropriate.

Professional judgement is central to this aim.


 

## Learning aim C: Apply AI to cybersecurity problems

### C1 Analysing cybersecurity-related data

Students should apply data analysis skills to security-related datasets.

- Exploring datasets such as access logs, traffic records or simulated alerts.
- Identifying patterns of normal behaviour.
- Recognising anomalies or suspicious events.
- Understanding noise, imbalance and missing data.
- Relating findings to security objectives.

Students should focus on interpretation rather than exploitation.

### C2 Programming and tool-based security workflows

Students should apply programming or configuration skills responsibly.

- Processing security data using structured workflows.
- Applying logic to filter, transform or summarise data.
- Using reproduction-friendly and documented workflows.
- Understanding how small logic changes affect outputs.
- Respecting ethical boundaries and access limits.

The emphasis is on transparent and maintainable processes.

### C3 Applying AI models in cybersecurity contexts

Students should apply AI models appropriately.

- Using models to classify or prioritise events.
- Interpreting probabilities and confidence levels.
- Understanding false positives and false negatives.
- Avoiding assumptions of certainty.
- Using AI outputs to support human judgement.

Students must understand that AI outputs require validation.

### C4 Testing, evaluation and resilience

Evaluation is critical in security contexts.

- Testing systems across varied scenarios.
- Evaluating effectiveness and reliability.
- Identifying weaknesses, blind spots or bias.
- Considering ethical risks from misclassification.
- Documenting evaluation outcomes.

Students should understand evaluation as risk reduction, not just accuracy improvement.

## Assessment criteria

### Learning aim A: Understand AI in cybersecurity

### Learning aim B: Review AI cybersecurity solutions

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe how AI is used to support cybersecurity.<br>**A.P2** Describe AI techniques and limitations in cybersecurity. | **A.M1** Analyse how AI techniques support threat detection and response. | **AB.D1** Evaluate the role, suitability and impact of AI in cybersecurity. |
| **B.P3** Describe how AI cybersecurity solutions are used to support organisations and users. | **B.M2** Explain how AI cybersecurity solutions support organisations and users. | |

### Learning aim C: Apply AI to cybersecurity problems

| Pass | Merit | Distinction |
|---|---|---|
| **C.P4** Prepare cybersecurity data to investigate potential security threats.<br>**C.P5** Use AI tools, models or algorithms to identify and interpret potential security threats. | **C.M3** Test and improve an AI-enabled cybersecurity solution using evaluation findings. | **C.D2** Evaluate the effectiveness of an AI-enabled cybersecurity solution. |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC * | SP – CT |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS | IS – T √ | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

* Signposted to indicate opportunities for development as a part of wider teaching and learning

√ Embedded in teaching, learning and assessment

blank Not embedded or signposted in unit

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aims A and B: (A.P1, A.P2, B.P3, A.M1, B.M2, AB.D1)

Learning aim C: (C.P4, C.P5, C.M3, C.D2)

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

#### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

#### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
    - word processing
    - presentation software.
- Web-based or installed AI tools, for example:
    - visual or no-code AI platforms
    - educational machine learning tools.
- Data handling tools, such as:
    - spreadsheet software
    - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

#### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
    - ethically sourced
    - appropriate for educational use
    - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aims A and B

**For distinction standard**, students should evaluate the role, suitability and impact of AI in cybersecurity. They should make justified judgements about how effectively AI supports cybersecurity objectives such as threat detection, threat analysis, fraud prevention, risk management and the protection of digital assets. Students should evaluate the strengths and limitations of AI-enabled cybersecurity approaches, considering factors such as effectiveness, reliability, resilience, usability and operational impact. They should consider the implications for organisations, users and wider society, including issues such as false positives, false negatives, adversarial behaviour, privacy, accountability and over-reliance on automated systems. Evidence should demonstrate balanced professional judgement supported by relevant examples and should include realistic recommendations for safeguards, improvements or alternative approaches where appropriate.

**For merit standard**, students should explain how AI cybersecurity solutions support organisations and users. They should analyse how techniques such as anomaly detection, classification and behaviour-based analysis support threat detection, threat analysis and response activities. Students should explain how AI-enabled cybersecurity solutions are used to improve monitoring, alert management, fraud detection, risk analysis and the protection of systems, networks and data. They should explain both the benefits and challenges of AI use in cybersecurity and demonstrate an understanding of how organisational requirements, stakeholder needs and practical constraints influence the deployment of AI-enabled solutions. Evidence should demonstrate clear links between AI techniques, cybersecurity solutions and the outcomes they support.

**For pass standard**, students should describe how AI is used to support cybersecurity and describe the AI techniques, limitations and applications associated with AI-enabled cybersecurity systems. They should describe how AI supports monitoring, threat detection, analysis and response activities within cybersecurity environments. Students should describe techniques such as anomaly detection, classification and behaviour-based detection, alongside limitations including false positives, false negatives, adversarial attacks and the use of AI by attackers. Students should also describe applications of AI-enabled cybersecurity solutions in real-world contexts, such as enterprise monitoring, intrusion detection, fraud detection, protection of customer data, security operations support and the protection of public services or critical infrastructure. Evidence is likely to be descriptive and should demonstrate correct use of terminology and an understanding of how AI supports cybersecurity professionals and organisations in addressing cybersecurity challenges.


 

## Learning aim C

**For distinction standard**, students should evaluate the suitability and impact of AI cybersecurity solutions in real-world contexts. They should make justified judgements about how effectively AI supports cybersecurity objectives such as threat detection, risk management, fraud prevention and protection of digital assets. Students should evaluate the strengths and limitations of AI-enabled cybersecurity approaches, considering factors such as reliability, effectiveness, resilience, usability and operational impact. They should consider the implications for organisations, users and wider society, including the potential consequences of incorrect decisions, over-reliance on automation and adversarial threats. Evidence should demonstrate balanced professional judgement supported by relevant examples and should include realistic recommendations for safeguards, improvements or alternative approaches where appropriate.

**For merit standard**, students should explain how AI cybersecurity solutions support organisations and users. They should explain how AI is used to improve monitoring, threat detection, alert management, fraud detection and risk analysis activities. Students should explain both the benefits and challenges of AI use in cybersecurity. They should explain how organisational requirements, stakeholder needs and practical constraints influence the use of AI-enabled cybersecurity solutions. Evidence should demonstrate clear links between cybersecurity objectives, AI capabilities and achieved outcomes

**For pass standard**, students should describe how AI is used to support cybersecurity in real-world contexts. This may include applications such as enterprise monitoring, intrusion detection, fraud detection, protection of customer data, security operations support or protection of public services and critical infrastructure.

## Links to other units

This unit links to:

- Unit 1: Introduction to Artificial Intelligence
- Unit 2: Fundamentals of Machine Learning
- Unit 3: Data Analysis and Interpretation
- Unit 4: Programming for AI
- Unit 5: Ethics in AI
- Unit 6: Testing and Evaluation of AI Models
- Unit 9: AI Algorithms
- Unit 10: Hands-on AI Projects
- Unit 11: AI in Business
- Unit 15: Big Data in AI
- Unit 16: Work Experience
- Unit 18: AI Tools and Platforms

# Unit 21: AI and Society

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit explores how AI works and how it affects individuals, organisations and society.

## Unit introduction

AI is increasingly influencing the way people live, work and make decisions. From personalised recommendations and automated decision-support systems to public services and business operations, AI is becoming part of everyday life. Understanding how AI works, the factors that shape its outputs, its impact on individuals, organisations and society is essential for anyone engaging with modern technologies.

In this unit, you will explore the fundamental concepts of AI and investigate how AI influences people, decisions and wider social outcomes. You will examine real-world examples of AI use, consider the benefits and risks associated with its adoption and evaluate how different groups may be affected by AI systems. Through research and investigation, you will develop the skills needed to think critically about the role of AI in society.

You will also learn how to assess whether AI is appropriate for different situations and make informed recommendations for its responsible use. By considering evidence, stakeholder perspectives, ethical issues and potential consequences, you will develop the knowledge and judgement needed to evaluate AI solutions and communicate balanced, well-supported recommendations for society.

## Learning aims

In this unit you will:

**A** Understand AI and its impact on society

**B** Explore how AI influences people, decisions and society

**C** Recommend how AI can be used responsibly in society.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand AI and its impact on society | **A1** Fundamental concepts of AI<br>**A2** Algorithms, decision-making and power<br>**A3** Ethical frameworks for AI<br>**A4** Social impact of AI<br>**A5** Governance, regulation and societal response | Students produce an individual report, article or presentation that explores how AI systems use data, algorithms and models to influence outcomes for individuals and society. Evidence should include explanations of key AI concepts, consideration of ethical and governance issues, and investigation of real-world examples of AI use. |
| **B** Explore how AI influences people, decisions and society | **B1** AI and human decision-making<br>**B2** AI and human behaviour<br>**B3** AI and social outcomes<br>**B4** Investigating AI influence | Students produce an individual report, article or presentation that explores how AI systems use data, algorithms and models to influence outcomes for individuals and society. Evidence should include explanations of key AI concepts, consideration of ethical and governance issues, and investigation of real-world examples of AI use. |
| **C** Recommend how AI can be used responsibly in society. | **C1** Identifying opportunities for AI use<br>**C2** Considering risks and consequences<br>**C3** Understanding stakeholder perspectives<br>**C4** Recommending responsible AI use<br>**C5** Communicating recommendations | Students produce an individual report, proposal or presentation that investigates the responsible use of AI in a given context. Evidence should include consideration of opportunities, risks, stakeholder perspectives and relevant evidence to determine whether AI is appropriate for the chosen situation. |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand AI and its impact on society

#### A1 Fundamental concepts of AI

- Definitions of AI and intelligent systems.
- The idea of AI as systems that analyse data to identify patterns, generate predictions or support decisions.
- Distinctions between:
  - traditional rule-based programs
  - data-driven AI systems.
- The role of algorithms and models in shaping system behaviour.
- The importance of training data in determining AI outcomes.
- Key limitations of AI, including lack of consciousness, moral judgement or contextual understanding.

Students should understand that AI systems do not ‘think’ or ‘decide’ in human terms.

#### A2 Algorithms, decision-making and power

- How algorithms encode decision rules and priorities.
- Use of optimisation goals (for example, accuracy, efficiency or profit).
- Probabilistic outputs and uncertainty.
- How algorithmic decisions can appear objective while reflecting human choices.
- The concept of automation bias and over-trust in algorithmic outputs.

Students should recognise that algorithm design is not value-neutral.

#### A3 Ethical frameworks for AI

- Fairness and non-discrimination.
- Transparency and explainability.
- Accountability and responsibility.
- Privacy and data protection.
- Human oversight and agency.
- Kindness and harm prevention.

Ethics should be presented as ongoing decision-making frameworks, not fixed rules.

### A4 Social impact of AI

- How AI affects access to services and opportunities.
- Risks of reinforcing inequality or exclusion.
- Effects on trust in institutions and decision-making.
- Power imbalances between organisations, governments and individuals.
- Differences in impact across social groups.

This section should highlight winners, losers and unintended consequences.

### A5 Governance, regulation and societal response

- Role of laws, regulations and standards.
- Organisational governance and ethical review.
- Public accountability and transparency.
- The role of education and public literacy about AI.
- Ongoing debates about regulation versus innovation.

Students should understand that AI governance is evolving and contested.

## Learning aim B: Explore how AI influences people, decisions and society

### B1 AI and human decision-making

Students should explore how AI influences the decisions people make.

- AI-generated recommendations.
- Personalised content and information.
- Decision-support systems.
- Automation bias and over-reliance on AI.
- Trust in AI-generated outputs.
- Human oversight and judgement.
- Situations where people accept or challenge AI advice.

Students should understand that AI can influence decisions without making decisions on behalf of people.

### B2 AI and human behaviour

Students should explore how AI can influence human behaviour.

- Access to services and opportunities.
- Inclusion and exclusion.
- Fairness and discrimination.
- Representation of different groups.
- Trust and confidence in AI systems.
- Impacts on employment and education.
- Intended and unintended outcomes.

- Recommendation systems.
- Personalised advertising.
- Social media algorithms.
- Content ranking and filtering.
- Engagement and attention mechanisms.
- Behavioural nudges.

Students should understand that AI systems can shape choices, behaviours and interactions.

**B3 AI and social outcomes**

Students should explore how AI can affect different groups of people.

- Access to services and opportunities.
- Inclusion and exclusion.
- Fairness and discrimination.
- Representation of different groups.
- Trust and confidence in AI systems.
- Impacts on employment and education.
- Intended and unintended outcomes.

Students should understand that AI systems may benefit some groups while disadvantaging others.

**B4 Investigating AI influence**

Students should investigate examples of AI use and consider their wider effects.

- Analysing AI use in real-world scenarios.
- Identifying stakeholders affected by AI.
- Comparing benefits and drawbacks.
- Examining evidence of impact.
- Identifying ethical concerns.
- Considering alternative approaches.
- Communicating findings.

Students should understand the impact of AI should be considered from multiple perspectives.

## Learning aim C: Recommend how AI can be used responsibly in society [EL-SRS]

### C1 Identifying opportunities for AI use

Students should consider situations where AI may provide benefits to individuals, organisations and society.

- Identifying problems that AI may help address.
- Improving efficiency and productivity.
- Supporting decision-making.
- Increasing access to services.
- Improving personalisation and user experiences.
- Supporting public services and community outcomes.
- Recognising situations where non-AI solutions may be equally effective.

Students should understand that AI should be adopted because it provides value, not simply because it is available.

### C2 Considering risks and consequences

Students should examine the potential risks associated with AI use.

- Bias and discrimination.
- Privacy and surveillance concerns.
- Accountability for AI-supported decisions.
- Loss of human oversight.
- Misinformation and manipulation.
- Exclusion of certain groups.
- Unintended consequences of AI deployment.
- Public trust and confidence.

Students should understand that responsible use of AI requires consideration of both benefits and risks.

### C3 Understanding stakeholder perspectives

Students should explore how AI use affects different stakeholders.

- Individuals and consumers.
- Employees and employers.
- Organisations and service providers.
- Governments and regulators.
- Communities and society.
- Groups that may be disproportionately affected by AI decisions.
- Conflicting stakeholder interests and priorities.

Students should understand that different stakeholders may experience the same AI system in different ways.

### C4 Recommending responsible AI use

Students should assess whether AI is appropriate in different contexts and justify recommendations.

- Assessing suitability for purpose.
- Assessing likely benefits and drawbacks.
- Considering reliability and limitations.
- Determining appropriate levels of human oversight.
- Identifying safeguards and controls.
- Comparing alternative approaches.
- Justifying decisions using evidence.

Students should understand that responsible AI adoption requires evidence-based decision making.

### C5 Communicating recommendations

Students should communicate and justify recommendations about AI use.

- Presenting balanced arguments.
- Supporting conclusions with evidence.
- Weighing benefits against risks.
- Recognising uncertainty and limitations.
- Recommending improvements or safeguards.
- Explaining recommendations clearly to different audiences.

Students should understand that responsible AI practice includes the ability to explain and justify decisions about AI use.

## Assessment criteria

### Learning aim A: Understand AI and its impact on society

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe how AI systems use data and algorithms to support decisions and actions. | **A.M1** Explain how AI design choices influence outcomes for individuals and society. | **A.D1** Evaluate the impact of AI systems on people and society. |

### Learning aim B: Explore how AI influences people, decisions and society

| Pass | Merit | Distinction |
|---|---|---|
| **B.P2** Describe ways AI influences human decisions and behaviour in a given context.<br>**B.P3** Describe the impact of AI on different stakeholders in a given context. | **B.M2** Analyse how AI influences people, decisions and social outcomes, considering both benefits and drawbacks. | **B.D2** Evaluate the impact of AI on people, decisions and society, drawing balanced conclusions. |

### Learning aim C: Recommend how AI can be used responsibly in society

| Pass | Merit | Distinction |
|---|---|---|
| **C.P4** Describe factors that influence the responsible use of AI in a given context. | **C.M3** Explain how stakeholder needs, evidence and potential risks influence recommendations about the use of AI in society. | **C.D3** Evaluate how AI can be used responsibly in society, making justified recommendations for its use. [SP-CT] |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT √ |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS |
| MY – COP | EL – SRS * | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.M1, A.D1)

Learning aim B: (B.P2, B.P3, B.M2, B.D2)

Learning aim C: (C.P4, C.M3, C.D3)

# Further information for teachers and assessors

## Resource requirements

For this unit, students must have access to the following resources.

### Hardware

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

### Software and digital tools

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

### Data resources

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students should evaluate the impact of AI systems on people and society. They should make justified judgements about how AI creates both opportunities and challenges for individuals, organisations and communities. Students should evaluate how design decisions, algorithmic processes, data selection and governance approaches influence social outcomes. Evaluation should consider impacts such as fairness, inclusion, privacy, trust, accountability, power and access to opportunities or services. Students should demonstrate a balanced perspective by considering both positive and negative consequences of AI adoption and should support conclusions with relevant examples and evidence.

**For merit standard**, students should explain how AI design choices influence outcomes for individuals and society. They should explain how factors such as algorithm design, training data, optimisation goals and system objectives shape the behaviour and outputs of AI systems. Students should explain how technical design decisions can affect fairness, transparency, access to services, decision-making and trust. Evidence should demonstrate clear links between how AI systems are developed and the social consequences that can arise from their use.

**For pass standard**, students should describe how AI systems use data and algorithms to support decisions and actions. They should describe the role of algorithms, models and training data in enabling AI systems to identify patterns, generate predictions and support decision-making. Students should recognise the differences between rule-based and data-driven systems and understand the limitations of AI systems.

### Learning aim B

**For distinction standard**, students will evaluate the impact of AI on people, decisions and society, drawing balanced conclusions supported by evidence. They will make reasoned judgements about the overall benefits, limitations and consequences of AI use in a chosen context or range of contexts. Students should consider different stakeholder perspectives, weigh positive and negative impacts and reach justified conclusions supported by relevant evidence. Evaluations should demonstrate critical thinking and recognise that AI may create benefits for some groups while creating challenges or disadvantages for others.

**For merit standard**, students will analyse how AI influences people, decisions and social outcomes, considering both benefits and drawbacks. They will examine how AI systems affect individuals, organisations and society, explaining the relationship between AI systems and their outcomes. Students should compare different impacts, consider alternative viewpoints and use evidence from real-world examples to show how AI can shape decisions, behaviour and opportunities. Analysis should go beyond description and explain why particular outcomes occur.

**For pass standard**, students should identify ways AI affects the choices people make and the behaviours they demonstrate. Evidence may include examples such as recommendation systems, personalised advertising, social media algorithms, navigation systems, content filtering or decision-support tools. Students should show an understanding that AI can influence decisions without making decisions on behalf of people. They should describe how AI can affect individuals, communities, organisations and wider society. Evidence should include consideration of positive and negative impacts, such as access to services, inclusion or exclusion, employment, fairness, representation, trust and confidence in AI systems. Students should recognise that different stakeholder groups may experience the same AI system in different ways.

### Learning aim C

**For distinction standard**, students will explain how AI can be used responsibly in society, making justified recommendations for its use. Students will draw together evidence from their investigation to reach well-reasoned conclusions about the suitability of AI in a given context. They should make recommendations that balance opportunities, risks, stakeholder needs and ethical considerations, justifying their decisions with relevant evidence. Responses should demonstrate a clear understanding that responsible AI use requires appropriate safeguards, human oversight and consideration of wider societal impacts.

**For merit standard**, students will explain how stakeholder needs, evidence and potential risks influence recommendations about the use of AI in society. Students should consider the perspectives of different stakeholders and explain how these perspectives affect decisions about AI adoption. They should use evidence to support their recommendations and explain how factors such as fairness, privacy, accountability, reliability, inclusion and public trust influence responsible AI use. Explanations should demonstrate an understanding of the trade-offs involved in adopting AI solutions.

**For pass standard**, students should identify and describe factors that need to be considered when deciding whether and how AI should be used. Evidence may include consideration of benefits and risks, privacy and data protection, bias and discrimination, reliability, human oversight, stakeholder needs, legal requirements and ethical concerns. Students should demonstrate an understanding that responsible AI use requires consideration of both opportunities and potential consequences. Students are expected to apply their understanding to a given context, such as education, healthcare, employment, public services, retail or another suitable setting. Evidence may be presented through a report, case study, presentation, article, proposal or other appropriate format that enables students to demonstrate their recommendations and supporting rationale.

## Links to other units

This unit links to all the other units in the specification.

# Unit 22: AI Project Management

**Level:** 3

**Unit type:** Internal

**Guided learning hours:** 60

## Unit in brief

This unit introduces the concept of planning, managing and delivering AI projects.

## Unit introduction

AI projects differ from traditional IT and software projects because they rely heavily on data quality, statistical models and iterative testing. Their outputs are often probabilistic rather than fixed, creating additional complexity for planning, delivery and evaluation. As a result, effective AI project management requires understanding data governance, model evaluation, risk management and ethical responsibility alongside core project management practice.

This unit enables you to develop the knowledge and skills needed to plan, manage and evaluate AI projects in realistic contexts, including how projects are scoped, resourced and delivered in response to data availability, technical constraints and stakeholder requirements.

This unit supports progression into higher education, apprenticeships or employment roles where understanding, coordinating or contributing to AI-based projects is increasingly essential.

It is recommended that this unit is delivered alongside *Unit 10: Hands-on AI Projects.*

## Learning aims

In this unit you will:

**A** Understand the concepts, principles and lifecycles that underpin AI project management

**B** Plan and coordinate the delivery of projects

**C** Monitor, evaluate and improve AI project outcomes.

## Summary of unit

| Learning aim | Key content areas | Assessment approach |
|---|---|---|
| **A** Understand the concepts, principles and lifecycles that underpin AI project management | **A1** AI concepts in a project context<br>**A2** The AI lifecycle as a project lifecycle<br>**A3** Stakeholders and roles in AI projects<br>**A4** AI project risks and constraints<br>**A5** Documentation and evidence in AI project management | Students create an AI project initiation pack for a chosen scenario. Evidence should include problem statement; stakeholders/RACI; AI lifecycle plan; data needs; success criteria; risk and ethics log; and outline governance. Students justify key decisions and reference one comparable real deployment. |
| **B** Plan and coordinate the delivery of projects | **B1** Project scoping and requirements<br>**B2** Stakeholder management<br>**B3** Planning AI project delivery<br>**B4** Risk and governance management<br>**B5** Managing project communication<br>**B6** Monitor project progress | Students produce a project management portfolio for a defined AI project. Evidence should include project planning documentation. |
| **C** Monitor, evaluate and improve AI project outcomes | **C1** Monitor AI project performance<br>**C2** Evaluating AI project outcomes<br>**C3** Review governance and compliance<br>**C4** Lessons learned and continuous improvement<br>**C5** Professional recommendations | Students produce an evaluation report, presentation or project review portfolio based on an AI project they have worked on and delivered. |

## Content

The essential content is set out under content areas. Students must cover all specified content before the assessment.

### Learning aim A: Understand the concepts, principles and lifecycles that underpin AI project management

#### A1 AI concepts in a project context

- AI as systems that use data and algorithms to produce outputs such as predictions, classifications, recommendations or generated content.
- The probabilistic nature of many AI outputs and the concept of uncertainty.
- Differences between:
  - deterministic software systems
  - data-driven AI systems that learn patterns.
- Why AI behaviour can change over time as data changes.
- The implications of uncertainty for acceptance testing, sign-off and deployment.

#### A2 The AI lifecycle as a project lifecycle

- Problem definition and feasibility: identifying a suitable problem, confirming AI is appropriate, defining success criteria and constraints.
- Data readiness and governance: sourcing data, checking permissions, assessing quality and bias.
- Model development or selection: choosing between simple baselines and more advanced approaches.
- Evaluation and validation: testing performance, robustness, fairness and limitations.
- Deployment and integration: putting outputs into real workflows.
- Monitoring and maintenance: tracking drift, performance decay and ethical risk.

#### A3 Stakeholders and roles in AI projects

- Typical roles such as project manager, product owner, data owner, data analyst, developer, domain expert, compliance/ethics representative and end user.
- The importance of cross-disciplinary communication.
- Managing stakeholder expectations about AI capability and limitations.
- Recognising conflicting priorities (e.g. speed versus safety).

#### A4 AI project risks and constraints

- Data availability, quality and representativeness risks.
- Bias and differential performance across user groups.
- Legal and regulatory constraints, especially around data.
- Lack of explainability or transparency.
- Overfitting, under-testing and false confidence.

- Integration risks with existing systems.
- Security and misuse risks, including adversarial behaviour.
- Resource constraints such as time, skills and computational cost.

**A5 Documentation and evidence in AI project management**

- Problem statements and assumptions.
- Data sourcing and preparation records.
- Model or tool selection rationale.
- Evaluation results and limitations.
- Risk registers and mitigation actions.
- Deployment and monitoring plans.

## Learning aim B: Plan and coordinate the delivery of projects [SP-PS]

**B1 Project scoping and requirements**

- Defining project objectives.
- Identifying business or societal needs.
- Establishing project success criteria.
- Determining project scope and constraints.
- Identifying assumptions and dependencies.
- Defining project deliverables.

**B2 Stakeholder management**

- Identifying stakeholders.
- Stakeholder responsibilities.
- Stakeholder requirements.
- Managing expectations.
- Communication methods.
- Resolving conflicting priorities.

**B3 Planning AI project delivery**

- Work breakdown structures (WBS).
- Project schedules and milestones.
- Task dependencies.
- Resource planning.
- Budgeting considerations.
- Contingency planning.

### B4 Risk and governance management

- Identifying project risks.
- Data-related risks.
- Ethical and legal risks.
- Maintaining risk registers.
- Governance checkpoints.
- Escalation processes.

### B5 Managing project communication

- Status reporting.
- Project documentation.
- Presenting technical information to non-technical stakeholders.
- Progress reviews.
- Decision logs.

### B6 Monitor project progress

- Tracking milestones.
- Reviewing project performance.
- Managing changes.
- Responding to issues.
- Maintaining quality standards.

## Learning aim C: Monitor, evaluate and improve AI project outcomes

### C1 Monitor AI project performance

- Reviewing project objectives.
- Analysing project outcomes.
- Measuring success criteria.
- Monitoring project KPIs.

### C2 Evaluating AI project outcomes

- Technical performance.
- Business impact.
- Societal impact.
- Stakeholder satisfaction.

### C3 Review governance and compliance

- Ethical compliance.
- Data governance.
- Regulatory requirements.
- Audit evidence.

### C4 Lessons learned and continuous improvement

- Identifying successes.
- Identifying limitations.
- Capturing lessons learned.
- Recommending improvements.

### C5 Professional recommendations

- Future development opportunities.
- Project continuation decisions.
- Alternative approaches.
- Benefits realisation planning.



 

## Assessment criteria

### Learning aim A: Understand the concepts, principles and lifecycles that underpin AI project management

| Pass | Merit | Distinction |
|---|---|---|
| **A.P1** Describe the concepts, principles and lifecycles that underpin AI project management. | **A.M1** Explain how AI lifecycles, stakeholder responsibilities, risks and governance influence the planning and delivery of AI projects. | **A.D1** Evaluate how project decisions, governance and ethical considerations contribute to responsible AI project delivery. [SP-CT] |

### Learning aim B: Plan and coordinate the delivery of projects

| Pass | Merit | Distinction |
|---|---|---|
| **B.P3** Produce project planning documentation for an AI project.<br>**B.P4** Apply project management processes to support the delivery of an AI project. | **B.M2** Explain how planning, stakeholder management, governance and risk controls support the successful delivery of AI projects. | **B.D2** Evaluate the effectiveness of project planning and management decisions during an AI project. [SP-CT] |

### Learning aim C: Monitor, evaluate and improve AI project outcomes

| Pass | Merit | Distinction |
|---|---|---|
| **C.P5** Describe the outcomes and performance of an AI project.<br>**C.P6** Describe how an AI project was monitored and reviewed. | **C.M3** Analyse how project decisions, governance and stakeholder requirements influenced project outcomes. | **C.D3** Evaluate the effectiveness and impact of an AI project, making justified recommendations for improvement. [SP-CT] |

## Transferable skills

| Managing Yourself | Effective Learning | Interpersonal Skills | Solving Problems |
|---|---|---|---|
| MY – TPR | EL – MOL | IS – WC | SP – CT √ |
| MY – PS&R | EL – CL | IS – V&NC | SP – PS * |
| MY – COP | EL – SRS | IS – T | SP – C&I |
| MY – PGS | EL – PRS | IS – C&SI | |

### Table key

| | |
|---|---|
| * | Signposted to indicate opportunities for development as a part of wider teaching and learning |
| √ | Embedded in teaching, learning and assessment |
| blank | Not embedded or signposted in unit |

## Essential information for assignments

The recommended structure of assessment is shown in the unit summary, along with suitable forms of evidence. The *Pearson BTEC International Level 3 Qualifications Supplementary Information* document gives information on setting assignments. There is also further information on our website.

There is a maximum number of three summative assignments for this unit.

The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.M1, A.D1)

Learning aim B: (B.P3, B.P4, B.M2, B.D2)

Learning aim C: (C.P5, C.P6, C.M3, C.D3)

## Further information for teachers and assessors

### Resource requirements

For this unit, students must have access to the following resources.

**Hardware**

- Access to desktop or laptop computers capable of running modern web browsers.
- Reliable internet connectivity.
- Projection facilities or interactive whiteboards for tutor-led demonstrations.

**Software and digital tools**

Students should have access to at least one of the following types of tools:

- General productivity software, such as:
  - word processing
  - presentation software.
- Web-based or installed AI tools, for example:
  - visual or no-code AI platforms
  - educational machine learning tools.
- Data handling tools, such as:
  - spreadsheet software
  - simple data analysis environments.

Open-source or free tools may be used where appropriate and sufficient for learning outcomes.

**Data resources**

- Access to sample datasets suitable for teaching AI concepts.
- Datasets should be:
  - ethically sourced
  - appropriate for educational use
  - relevant to real-world contexts.


 

## Essential information for assessment decisions

### Learning aim A

**For distinction standard**, students will evaluate how project decisions, governance and ethical considerations contribute to responsible AI project delivery**.** They will make reasoned judgements about how AI project approaches support effective and responsible outcomes, considering factors such as stakeholder needs, risk management, governance, transparency and ethical responsibility. Students should evaluate trade-offs that arise during AI projects, such as performance versus explainability, speed versus risk control, or automation versus human oversight. Evidence should demonstrate balanced conclusions supported by relevant examples and show an understanding that successful AI projects require both effective project management and responsible governance.

**For merit standard**, students will explain how AI lifecycles, stakeholder responsibilities, risks and governance influence the planning and delivery of AI projects. They should explain how different stages of the AI lifecycle shape project activities and decision-making and how stakeholder roles contribute to successful project delivery. Students should explain how risks, constraints and governance requirements affect planning and management processes, including decisions relating to data, resources, compliance and project controls. Evidence should demonstrate clear links between project activities and AI-specific considerations.

**For pass standard**, students will describe the concepts, project lifecycle stages and stakeholder roles involved in the planning and delivery of AI projects. Evidence should include descriptions of core AI concepts relevant to project delivery, the stages of an AI project lifecycle and the responsibilities of different stakeholders involved in AI projects. Students should demonstrate an understanding of how AI projects differ from traditional technology projects and describe the contribution of key roles such as project managers, data specialists, developers, domain experts and end users.

### Learning aim B

**For distinction standard**, students will evaluate the effectiveness of project planning and management decisions made during an AI project. They will make reasoned judgements about how project management approaches supported or hindered successful delivery. Students should evaluate the effectiveness of planning, stakeholder management, communication, governance and risk management activities, using evidence from project documentation and outcomes. They should consider strengths, limitations and trade-offs and make justified recommendations for improving future AI project delivery. Evidence should demonstrate professional judgement and recognise that successful AI projects require balancing stakeholder needs, project constraints, ethical considerations and organisational objectives.

**For merit standard**, students will explain how planning, stakeholder management, governance and risk controls support the successful delivery of AI projects. They should explain how project management processes help to coordinate activities, manage resources, control risks and support project objectives. Students should demonstrate understanding of how communication, stakeholder engagement, governance requirements and risk management contribute to effective project delivery. Evidence should show clear links between project management decisions and project outcomes, supported by examples from an AI project context.

**For pass standard**, students will produce project planning documentation for an AI project. Evidence should include project management documentation such as project objectives, scope, success criteria, stakeholder information, schedules, milestones, resource plans, risk registers or communication plans. Documentation should be clear, organised and appropriate to the project context. Students should demonstrate that they can identify the key elements needed to plan and coordinate an AI project effectively. Students will apply project management processes to support the delivery of an AI project. They should demonstrate the use of project management activities such as monitoring progress, managing risks, coordinating resources, communicating with stakeholders and reviewing project performance against planned objectives. Evidence should show that students can follow project management processes in a structured manner and maintain appropriate records of decisions, actions and project updates. At this level, evidence may be relatively straightforward but should demonstrate a clear connection between the project management activities undertaken and the successful delivery of project tasks.

## Learning aim C

**For distinction standard**, students will evaluate the effectiveness and impact of an AI project, making justified recommendations for improvement. They will make balanced judgements about the extent to which project objectives were achieved and whether AI was an appropriate solution for the identified problem. Students should evaluate project outcomes from technical, organisational, ethical and stakeholder perspectives, considering the effectiveness of governance, project controls and decision-making throughout the project lifecycle. Evidence should demonstrate professional judgement, supported by project evidence, and include justified recommendations for future improvements, ongoing monitoring, alternative approaches or further development. Strong distinction responses will recognise remaining risks, limitations and wider implications of project decisions.

**For merit standard**, students will analyse how project decisions, governance and stakeholder requirements influenced project outcomes. They should examine how planning, risk management, communication, resource allocation and governance arrangements contributed to project success or created challenges during delivery.

Students should consider how stakeholder needs and expectations influenced decisions and project priorities. Evidence should demonstrate clear links between project management activities and outcomes, supported by examples from the project context. Analysis should move beyond description and identify causes, consequences and relationships between decisions and results.

**For pass standard**, students will describe the outcomes and performance of an AI project. Evidence should include a summary of project objectives, deliverables and outcomes, together with a description of how success was measured. They should identify key achievements, project benefits and any limitations of the project. They should demonstrate awareness of how project performance can be measured using criteria such as objectives achieved, stakeholder satisfaction, quality standards or key performance indicators.

Students will also describe how an AI project was monitored and reviewed. Evidence should include examples of project monitoring and review activities such as progress reporting, milestone reviews, risk monitoring, governance checks, stakeholder feedback and project evaluation processes. Students should demonstrate that they can identify how project information was collected and used to support decision-making and project control.
At this level, evidence may be straightforward but should show a clear understanding of the importance of monitoring and review activities in supporting successful AI project delivery.

## Links to other units

This unit links to all the other units in the specification.

# 5 Planning your programme

## Is there a student entry requirement?

As a centre it is your responsibility to ensure that students who are recruited have a reasonable expectation of success on the programme. There are no formal entry requirements but we expect students to have qualifications at or equivalent to Level 2.

Students are most likely to succeed if they have:

- five international GCSEs at good grades, and/or
- BTEC qualification(s) at Level 2
- other appropriate qualifications or achievement at year 11 or age 16 in core subjects. Students may demonstrate ability to succeed in various ways. For example, students may have relevant work experience or specific aptitude shown through diagnostic tests or non-educational experience.

If students are studying in English we recommend that they have attained at least Level B2 in the Common European Framework of Reference for Languages or Pearson Global Scale of English 51. Please see resources available from Pearson at www.pearson.com/english.

## Supporting you in planning and implementing your programme

There will be lots of free teaching and learning support to help you deliver the new qualifications:

- Delivery guides are provided for each mandatory unit as well as a selection of optional units. These guides are intended to give an introducton to the unit, an overview of the assessment requirements, and a summary of the teaching content to be delivered and assessed.
- Sample delivery plans for all qualification sizes, designed to help you plan and deliver a teaching programme across a specified duration. These plans consist of the mandatory units required in each size as well as a selection of optional units recommended by us.
- Sample schemes of work are provided for each mandatory unit as well as a selection of optional units. These schemes of work are intended to show you how to deliver the teaching and assessment for each unit within the guided learning hours given. Each scheme of work provides an example of how each lesson can be structured, identifying key teaching topic areas, and how this content can be delivered using a range of teacher and student activities. These are available in Word™ format for ease of customisation.
- Our resources guide sets out the minimum resources required to support the planning, teaching and preparation for assessments for all units in this specification.

- For units assessed with a Pearson Set Assignment Brief, we have provided a sample assignment as an example of the form of assessment for the unit. For the remaining units, we will allow you to set your own assignments, according to your students' preferences and to link with your local employment profile. We also provide Authorised Assignment Briefs, which are approved by Pearson Standards Verifiers.

## Using Pearson Progress to support the planning, delivery and management of internal assessments

Pearson Progress is a digital support system that helps you to manage the assessment and quality assurance of these qualifications. This application supports the delivery, assessment and quality assurance of International BTECs in centres and supports teachers, assessors and students as follows:

- course creation
- creating and verifying assignments
- creating assessment plans and recording assessment decisions
- upload of assignment evidence
- tracking progress of every student.

The system is accessible to teachers and students so that they both can track their progress.

## Training and support from Pearson

There are many people available to support you and give you advice and guidance on the delivery of these qualifications. They include the following:

- Subject Advisors – they understand all Pearson qualifications in their sector and can answer sector-specific queries on planning, teaching, learning and assessment.
- Standards Verifiers – they can support you with preparing your assignments, ensuring that your assessment plan is set up correctly, and support you in preparing student work and providing quality assurance through sampling.
- Regional teams – they are regionally based and have a full overview of the BTEC qualifications and of the support and resources that Pearson provides. Regions often run network events.
- Customer Services – the 'Support for You' section of our website gives the different ways in which you can contact us for general queries. For specific queries, our service operators can direct you to the relevant person or department.

Pearson provides a range of training and professional development events to support the introduction, delivery, assessment and administration of BTEC International Level 3 qualifications. These sector-specific events, developed and delivered by specialists, are available both face to face and online.

We also offer ‘Getting Ready to Teach’ events which are designed to get teachers ready for delivery of the BTEC International Level 3 qualifications. They include an overview of qualification structures, planning and preparation for internal assessment, and quality assurance.

Beyond the ‘Getting Ready to Teach’ professional development events, there are opportunities for teachers to attend sector- and role- specific events. These events are designed to connect practice to theory; they provide teacher support and networking opportunities with delivery, learning and assessment methodology.

Details of our training and professional development programme can be found on our website.

# 6 Understanding the qualification grade

## Awarding and reporting for the qualification

This section explains the rules that we apply in awarding a qualification and in providing an overall qualification grade for each student. It shows how all the qualifications in this sector are graded.

## Eligibility for an award

In order to be awarded a qualification, a student must complete all units AND achieve a Pass or above in all mandatory units unless otherwise specified. Refer to the structure in *Section 3 Structure*. Students must:

- complete and **have an outcome** (D, M, P or U) for all units within a valid combination
- achieve all the **mandatory units at Pass or above** shown in *Section 3 Structure*
- achieve the **minimum number of points** at a grade threshold.

It is the responsibility of a centre to ensure that a correct unit combination is adhered to. Students who do not achieve the required minimum grade (P) in units shown in the structure will not achieve a qualification.

Students who do not achieve sufficient points for a qualification or who do not achieve all the required units may be eligible to achieve a smaller qualification in the same suite, provided they have completed and achieved the correct combination of units and met the appropriate qualification grade points threshold.

## Awarding the qualification grade

The final grade awarded for a qualification represents an aggregation of a student's performance across the qualification. As the qualification grade is an aggregate of the total performance, there is some element of compensation in that a higher performance in some units may be balanced by a lower outcome in others.

BTEC International Level 3 qualifications are awarded at the grade ranges shown in the table below.

| Qualification | Available grade range |
|---|---|
| **Certificate, Extended Certificate, Foundation Diploma** | P to D* |
| **Diploma** | PP to D*D* |
| **Extended Diploma** | PPP to D*D*D* |

The *Calculation of the qualification grade* table, shown later in this section, shows the minimum thresholds for calculating these grades. The table will be kept under review over the lifetime of the qualification. The most up-to-date table will be issued on our website.

Pearson will monitor the qualification standard and reserves the right to make appropriate adjustments.

Students who do not meet the minimum requirements for a qualification grade to be awarded will be recorded as Unclassified (U) and will not be certificated. They may receive a Notification of Performance for individual units. The *Information Manual* gives full information.

## Points available for units

The table below shows the number of **points** available for units. For each unit, points are allocated depending on the grade awarded.

| Grade | Unit size (60 GLH) |
|---|---|
| **U** | 0 |
| **Pass** | 6 |
| **Merit** | 10 |
| **Distinction** | 16 |

## Claiming the qualification grade

Subject to eligibility, Pearson will automatically calculate the qualification grade for your students when the unit grades are submitted and the qualification claim is made. Students will be awarded qualification grades for achieving the sufficient number of points (with valid combinations) within the ranges shown in the relevant *Calculation of the qualification grade grade* table for the cohort.

## Calculation of the qualification grade

Applicable for registration from 1 September 2026.

| Certificate | | Extended Certificate | | Foundation Diploma | | Diploma | | Extended Diploma | |
|---|---|---|---|---|---|---|---|---|---|
| 180 GLH | | 360 GLH | | 540 GLH | | 720 GLH | | 1080 GLH | |
| **Grade** | **Points threshold** | **Grade** | **Points threshold** | **Grade** | **Points threshold** | **Grade** | **Points threshold** | **Grade** | **Points threshold** |
| **Unclassified** | 0 | U | 0 | U | 0 | U | 0 | U | 0 |
| **Pass** | 18 | P | 36 | P | 54 | PP | 72 | PPP | 108 |
| | | | | | | MP | 88 | MPP | 124 |
| | | | | | | | | MMP | 140 |
| **Merit** | 26 | M | 52 | M | 78 | MM | 104 | MMM | 156 |
| | | | | | | DM | 124 | DMM | 176 |
| | | | | | | | | DDM | 196 |
| **Distinction** | 42 | D | 74 | D | 108 | DD | 144 | DDD | 216 |
| | | | | | | D*D | 162 | D*DD | 234 |
| | | | | | | | | D*D*D | 252 |
| **Distinction*** | 48 | D* | 90 | D* | 138 | D*D* | 180 | D*D*D* | 270 |

This table is subject to review over the lifetime of the qualification. The most up-to-date version will be issued via our website.

## Example grading tables

In this section, you will find examples of how students can meet a range of qualification grade thresholds based on the unit points accumulated, to determine an overall qualification grade.

### Pearson BTEC International Level 3 Certificate in Artificial Intelligence (180 GLH)

#### Achievement of a Certificate with a Merit grade

| Unit number | GLH | Type (Int/PSA) | Grade | Unit points |
|---|---|---|---|---|
| **1** | 60 | PSA | Pass | 6 |
| **12** | 60 | Int | Merit | 10 |
| **13** | 60 | Int | Distinction | 16 |
| **TOTAL** | **180** | | **Merit** | **32** |

In this example, the student has sufficient points for a Merit grade. The student has met the minimum requirement for Pass or higher in the mandatory unit.

### Pearson BTEC International Level 3 Extended Certificate in Artificial Intelligence (360 GLH)

#### Achievement of an Extended Certificate with a Pass grade

| Unit number | GLH | Type (Int/PSA) | Grade | Unit points |
|---|---|---|---|---|
| **1** | 60 | PSA | Distinction | 16 |
| **2** | 60 | PSA | Merit | 10 |
| **9** | 60 | Int | Pass | 6 |
| **12** | 60 | Int | Pass | 6 |
| **13** | 60 | Int | Pass | 6 |
| **14** | 60 | Int | Pass | 6 |
| **TOTAL** | **360** | | **Pass** | **50** |

In this example, the student has sufficient points for a Pass grade. The student has met the minimum requirement for Pass or higher in the mandatory units.

## Pearson BTEC International Level 3 Foundation Diploma in Artificial Intelligence (540 GLH)

### Achievement of a Foundation Diploma with a Distinction grade

| Unit number | GLH | Type (Int/PSA) | Grade | Unit points |
|---|---|---|---|---|
| **1** | 60 | PSA | Distinction | 16 |
| **2** | 60 | PSA | Merit | 10 |
| **3** | 60 | PSA | Distinction | 16 |
| **9** | 60 | Int | Distinction | 16 |
| **10** | 60 | Int | Pass | 6 |
| **12** | 60 | Int | Merit | 10 |
| **13** | 60 | Int | Merit | 10 |
| **14** | 60 | Int | Distinction | 16 |
| **15** | 60 | Int | Distinction | 16 |
| **TOTAL** | **540** | | **Distinction** | **116** |

In this example, the student has sufficient points for a Distinction grade. The student has met the minimum requirement for Pass or higher in the mandatory units.

### Pearson BTEC International Level 3 Diploma in Artificial Intelligence (720 GLH)

**Achievement of a Diploma with a PP grade**

| Unit number | GLH | Type (Int/PSA) | Grade | Unit points |
|---|---|---|---|---|
| **1** | 60 | PSA | Pass | 6 |
| **2** | 60 | PSA | Merit | 10 |
| **3** | 60 | PSA | Merit | 10 |
| **4** | 60 | PSA | Pass | 6 |
| **5** | 60 | PSA | Merit | 10 |
| **9** | 60 | Int | Pass | 6 |
| **10** | 60 | Int | Merit | 10 |
| **12** | 60 | Int | Unclassified | 0 |
| **13** | 60 | Int | Unclassified | 0 |
| **14** | 60 | Int | Merit | 10 |
| **15** | 60 | Int | Pass | 6 |
| **16** | 60 | Int | Merit | 10 |
| **TOTAL** | **720** | | **PP** | **84** |

In this example, the student has sufficient points for a PP grade despite receiving an Unclassified result for Units 12 and 13. The student has met the minimum requirement for Pass or higher in the mandatory units.

### Pearson BTEC International Level 3 Diploma in Artificial Intelligence (720 GLH)

#### Achievement of a Diploma with an MM grade

| Unit number | GLH | Type (Int/PSA) | Grade | Unit points |
|---|---|---|---|---|
| **1** | 60 | PSA | Merit | 10 |
| **2** | 60 | PSA | Merit | 10 |
| **3** | 60 | PSA | Distinction | 16 |
| **4** | 60 | PSA | Pass | 6 |
| **5** | 60 | PSA | Distinction | 16 |
| **9** | 60 | Int | Pass | 6 |
| **10** | 60 | Int | Merit | 10 |
| **12** | 60 | Int | Pass | 6 |
| **13** | 60 | Int | Pass | 6 |
| **14** | 60 | Int | Merit | 10 |
| **15** | 60 | Int | Distinction | 16 |
| **16** | 60 | Int | Merit | 10 |
| **TOTAL** | **720** | | **MM** | **122** |

In this example, the student has sufficient points for an MM grade. The student has met the minimum requirement for Pass or higher in the mandatory units.

## Pearson BTEC International Level 3 Diploma in Artificial Intelligence (720 GLH)

### An Unclassified result for a Diploma

| Unit number | GLH | Type (Int/PSA) | Grade | Unit points |
|---|---|---|---|---|
| **1** | 60 | PSA | Unclassified | 0 |
| **2** | 60 | PSA | Merit | 10 |
| **3** | 60 | PSA | Distinction | 16 |
| **4** | 60 | PSA | Pass | 6 |
| **5** | 60 | PSA | Distinction | 16 |
| **9** | 60 | Int | Pass | 6 |
| **10** | 60 | Int | Merit | 10 |
| **12** | 60 | Int | Pass | 6 |
| **13** | 60 | Int | Pass | 6 |
| **14** | 60 | Int | Merit | 10 |
| **15** | 60 | Int | Distinction | 16 |
| **16** | 60 | Int | Merit | 10 |
| **TOTAL** | **720** | | **Unclassified** | **112** |

In this example, the student has sufficient points for an MM grade but has not met the minimum requirement for Pass or higher in all of the mandatory units. An Unclassified result for Unit 1.

## Pearson BTEC International Level 3 Extended Diploma in Artificial Intelligence (1080 GLH)

### Achievement of an Extended Diploma with an MMM grade

| Unit number | GLH | Type (Int/PSA) | Grade | Unit points |
|---|---|---|---|---|
| **1** | 60 | PSA | Pass | 6 |
| **2** | 60 | PSA | Merit | 10 |
| **3** | 60 | PSA | Pass | 6 |
| **4** | 60 | PSA | Pass | 6 |
| **5** | 60 | PSA | Distinction | 16 |
| **6** | 60 | PSA | Pass | 6 |
| **7** | 60 | PSA | Pass | 6 |
| **8** | 60 | PSA | Merit | 10 |
| **9** | 60 | Int | Pass | 6 |
| **10** | 60 | Int | Distinction | 16 |
| **11** | 60 | Int | Merit | 10 |
| **12** | 60 | Int | Pass | 6 |
| **13** | 60 | Int | Unclassified | 0 |
| **14** | 60 | Int | Merit | 10 |
| **15** | 60 | Int | Pass | 6 |
| **17** | 60 | Int | Merit | 10 |
| **19** | 60 | Int | Distinction | 16 |
| **22** | 60 | Int | Merit | 10 |
| **TOTAL** | **1080** | | **MMM** | **156** |

In this example, the student has sufficient points for an MMM grade despite receiving Unclassified result for Unit 13. The student has met the minimum requirement for Pass or higher in the mandatory units.

### Pearson BTEC International Level 3 Extended Diploma in Artificial Intelligence (1080 GLH)

**Achievement of an Extended Diploma with a DDD grade**

| Unit number | GLH | Type (Int/PSA) | Grade | Unit points |
|---|---|---|---|---|
| **1** | 60 | PSA | Distinction | 16 |
| **2** | 60 | PSA | Merit | 10 |
| **3** | 60 | PSA | Merit | 10 |
| **4** | 60 | PSA | Pass | 6 |
| **5** | 60 | PSA | Distinction | 16 |
| **6** | 60 | PSA | Pass | 6 |
| **7** | 60 | PSA | Distinction | 16 |
| **8** | 60 | PSA | Distinction | 16 |
| **9** | 60 | Int | Merit | 10 |
| **10** | 60 | Int | Distinction | 16 |
| **11** | 60 | Int | Merit | 10 |
| **12** | 60 | Int | Distinction | 16 |
| **13** | 60 | Int | Merit | 10 |
| **14** | 60 | Int | Merit | 10 |
| **15** | 60 | Int | Distinction | 16 |
| **17** | 60 | Int | Merit | 10 |
| **19** | 60 | Int | Distinction | 16 |
| **22** | 60 | Int | Merit | 10 |
| **TOTAL** | **1080** | | **DDD** | **220** |

In this example, the student has sufficient points for a DDD grade. The student has met the minimum requirement for Pass or higher in the mandatory units.

### Pearson BTEC International Level 3 Extended Diploma in Artificial Intelligence (1080 GLH)

**An Unclassified result for an Extended Diploma**

| Unit number | GLH | Type (Int/PSA) | Grade | Unit points |
|---|---|---|---|---|
| **1** | 60 | PSA | Unclassified | 0 |
| **2** | 60 | PSA | Merit | 10 |
| **3** | 60 | PSA | Pass | 6 |
| **4** | 60 | PSA | Pass | 6 |
| **5** | 60 | PSA | Pass | 6 |
| **6** | 60 | PSA | Pass | 6 |
| **7** | 60 | PSA | Merit | 10 |
| **8** | 60 | PSA | Merit | 10 |
| **9** | 60 | Int | Merit | 10 |
| **10** | 60 | Int | Pass | 6 |
| **11** | 60 | Int | Merit | 10 |
| **12** | 60 | Int | Unclassified | 0 |
| **13** | 60 | Int | Pass | 6 |
| **14** | 60 | Int | Merit | 10 |
| **15** | 60 | Int | Unclassified | 0 |
| **17** | 60 | Int | Merit | 10 |
| **19** | 60 | Int | Pass | 6 |
| **22** | 60 | Int | Merit | 10 |
| **TOTAL** | **1080** | | **Unclassified** | **122** |

In this example, the student has sufficient points for a PPP grade but has not met the minimum requirement for Pass or higher in all of the mandatory units. An Unclassified result for Unit 1.

# Appendix 1 Glossary of terms used for internally assessed units

| Term | Definition |
|---|---|
| **Adequate** | Student work is satisfactory or acceptable in quality and quantity. |
| **Analyse** | Students break the issue/situation down into the key elements and show their understanding of the issues/situation applied to the scenario/context. Responses would be significantly beyond generic. |
| **Apply/use/employ** | Students implement a method, technique, process or approach in an activity. |
| **Assess** | Students give careful consideration to all the factors or events that apply, identify which are the most important or relevant, and make a judgement on the importance of the factors. |
| **Carry out** | Students demonstrate skills through practical activities, in line with certain requirements. |
| **Clear/ly** | The qualities required are well demonstrated, unambiguous and beyond a basic level. |
| **Coherent** | Student intentions are clear, logically structured and can be interpreted by others. |
| **Compare** | Students show knowledge and understanding by identifying the main factors relating to two or more items/situations or aspects of a subject that is extended with the required explanations, e.g. similarities/differences, advantages/disadvantages, impacts. |
| **Comprehensive** | Used to describe either scope or depth, for example:<br>Student work is well developed and thorough, covering all aspects/information in terms of both depth and breadth.<br>OR<br>Students demonstrate in-depth and accurate understanding of the aspects being assessed. |
| **Confident** | Student work demonstrates well-developed and secure application of skills or processes that are significantly beyond a basic level. |

| Term | Definition |
|---|---|
| **Consistent** | Students demonstrate reliable and constant practice that maintains a set standard. |
| **Create/produce** | Students generate an idea/outcome to specific criteria. |
| **Demonstrate** | Students carry out and apply knowledge, understanding and/or skills in a practical situation. |
| **Describe** | Students provide an account of something, or highlight a number of key features of a given topic or process, that shows a level of understanding. |
| **Detailed** | Students cover most if not all of the expected requirements and demonstrate a high level of understanding. |
| **Develop** | Students apply a process of improving/progressing skills, concepts or work in order to produce outcomes. |
| **Discuss** | An issue, situation or process will be presented and the student will need to break the issue/situation/process down into the key elements, show their understanding of the issues/situation/process applied to the scenario/context (so generic answers are not acceptable), and show interrelationship in their answers. |
| **Effective** | Students demonstrate skills or provide outcomes that are well developed with a range of proficient qualities and that achieve objectives. |
| **Evaluate** | Students consider various aspects of a subject's qualities in relation to its context such as strengths or weaknesses, advantages or disadvantages, pros or cons. They will come to a judgement supported by evidence, which will often be in the form of a conclusion. |
| **Examine** | Students demonstrate an ability to thoroughly inspect something in order to determine its qualities beyond a basic exploration. |
| **Explain** | Students can give an insight into the topic showing some level of understanding by providing reasons or examples. |
| **Explore** | Students undertake practical research or investigation to develop their skills or understanding of the topic/activity. |
| **Implement** | Students take actions or measures to put something into effect. |

| Term | Definition |
|---|---|
| **Investigate** | Students perform a systematic inquiry into a topic using research skills, usually to demonstrate their understanding of a topic. |
| **Justify** | Students give relevant and logical reasons or evidence to support their actions or opinions. |
| **Partial/some** | To an extent, but not completely. Students do not include all of the requirements. |
| **Perform** | Students demonstrate a range of skills required to complete a given activity. |
| **Prepare** | Students organise a task/equipment/individuals/activities in advance of carrying it out. |
| **Realistic/feasible** | Students demonstrate insight into the logistics and manageability of proposals/plans/objectives/ideas and show consideration of the potential to achieve the outcomes. |
| **Refine/optimise** | Students make considered improvements to outcomes. |
| **Review** | Students consider evidence in order to make judgements about the qualities. |
| **Understand** | Students demonstrate insight or ability to interpret a subject. |
| **Undertake** | Students demonstrate skills through practical activities, often referring to given processes or techniques. |

# Appendix 2 Transferable Skills framework

Code = transferable skill initials-skill cluster initials

## Managing yourself

| Code | Skill cluster | Performance descriptor |
|---|---|---|
| MY-TPR | Taking personal responsibility | • Demonstrates understanding of their role and responsibilities and the expected standards of behaviour.<br>• Demonstrates compliance with codes of conduct and ways of working.<br>• Makes use of available resources to complete tasks.<br>• Manages their time to meet deadlines and the required standards.<br>• Demonstrates accountability for their decisions or actions. |
| MY-PS&R | Personal strengths and resilience | • Identifies own personal strengths and demonstrates the ability to use these in relevant areas.<br>• Demonstrates the ability to adapt own mindset and actions to changing situations or factors.<br>• Uses challenges as learning opportunities. |

| Code | Skill cluster | Performance descriptor |
|---|---|---|
| MY-COP | Career orientation planning | • Undertakes research to understand the types of roles in the sector in which they could work.<br>• Reviews own career plans against personal strengths and identifies areas for development to support progression into selected careers.<br>• Takes part in sector-related experiences to support career planning. |
| MY-PGS | Personal goal setting | • Sets SMART goals using relevant evidence and information.<br>• Reviews progress against goals and identifies realistic areas for improvement.<br>• Seeks feedback from others to improve own performance. |

## Effective learning

| Code | Skill cluster | Performance descriptor |
|---|---|---|
| EL-MOL | Managing own learning | • Maintains a focus on own learning objectives when completing a task.<br>• Demonstrates the ability to work independently to complete tasks.<br>• Reviews and applies learning from successful and unsuccessful outcomes to be effective in subsequent tasks. |
| EL-CL | Continuous learning | • Engages with others to obtain feedback about own learning progress.<br>• Responds positively to feedback on learning progress from others.<br>• Monitors own learning and performance over the short- and medium-term. |
| EL-SRS | Secondary research skills | • Defines the research topic or question.<br>• Uses valid and reliable sources to collate secondary data.<br>• Interprets secondary data and draws valid conclusions.<br>• Produces a reference list and cites sources appropriately. |
| EL-PRS | Primary research skills | • Defines the research topic or question.<br>• Carries out primary data collection using appropriate and ethical research methodology.<br>• Interprets primary data to draw valid conclusions. |

## Interpersonal skills

| Code | Skill cluster | Performance descriptor |
|---|---|---|
| IS-WC | Written communication | • Produces clear formal written communication using appropriate language and tone to suit purpose. |
| IS-V&NC | Verbal and non-verbal communications | • Uses verbal communication skills effectively to suit audience and purpose.<br>• Uses body language and non-verbal cues effectively.<br>• Uses active listening skills and checks understanding when interacting with others. |
| IS-T | Teamwork | • Engages positively with team members to understand shared goals, and own roles and responsibilities.<br>• Respectfully considers the views of team members and consistently shows courtesy and fairness.<br>• Completes activities in line with agreed role and responsibilities.<br>• Provides support to team members to achieve shared goals. |
| IS-C&SI | Cultural and social intelligence | • Demonstrates awareness of own cultural and social biases.<br>• Demonstrates diversity, tolerance and inclusivity values in their approach to working with others. |

## Solving problems

| Code | Skill cluster | Performance descriptor |
|---|---|---|
| SP-CT | Critical thinking | • Demonstrates understanding of the problem or issue to be addressed.<br>• Makes use of relevant information to build ideas and arguments.<br>• Assesses the importance, relevance and/or credibility of information.<br>• Analyses, interprets and evaluates information to present reasoned conclusions. |
| SP-PS | Problem solving | • Presents a clear definition of the problem.<br>• Gathers relevant information to formulate proposed solutions.<br>• Selects relevant and significant information to formulate proposed solutions.<br>• Identifies negative and positive implications of proposed solutions.<br>• Presents and justifies selected solutions to problems. |
| SP-C&I | Creativity and innovation | • Identifies new and relevant ideas to help solve a problem.<br>• Refines ideas into workable solutions based on test results and/or feedback. |

# Appendix 3 Digital Skills framework

## Problem solving

Using digital tools to analyse and solve problems:

| Performance descriptor | Unit mapping |
|---|---|
| Use digital tools and techniques for research, collaboration and resolution of problems. | Units 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 |
| Have up-to-date knowledge of ways that technology is used within a sector. | Units 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 |
| Present ideas and findings using digital tools. | Units 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 |
| Use digital tools to manipulate data. | Units 1, 2, 3, 4, 6, 7, 10, 13, 14, 15, 17, 18, 19, 20, 22 |

## Digital collaboration and communication

Using digital tools to communicate and share information with stakeholders:

| Performance descriptor | Unit mapping |
|---|---|
| Understand and use digital collaboration and communication platforms. | Units 1, 2, 3, 4, 6, 10, 12, 16, 17, 18, 19, 20, 21, 22 |
| Use collaboration tools to meet with, share and collaborate with customers and colleagues. | Units 4, 6, 7, 10, 12, 13, 16, 17, 18, 19, 20, 22 |

## Transacting digitally

Using digital tools to set up accounts and pay for goods/services:

| Performance descriptor | Unit mapping |
|---|---|
| Use online systems to access and update digital records. | Units 6, 8, 9, 10, 13, 15, 16, 17, 18, 19, 20, 21, 22 |
| Set up accounts to complete transactions. | Units 10, 16, 17, 19, 20, 22 |

## Digital security

Identify threats and keep digital tools safe:

| Performance descriptor | Unit mapping |
|---|---|
| Understand the types of malware. | Units 3, 5, 6, 10, 12, 16, 18, 20, 21, |
| Understand the threats involved in carrying out online activities. | Units 1, 3, 4, 5, 9, 10, 15, 16, 17, 18, 19, 20, 21, 22 |
| Protect personal and organisation information and data. | Units 3, 5, 8, 10, 13, 16, 17, 18, 19, 20, 21, 22 |
| Keeping systems secure. | Units 3, 4, 5, 8, 10, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22 |

## Handling data safely and securely

Follow correct procedures when handling personal and organisational data:

| Performance descriptor | Unit mapping |
|---|---|
| Manage passwords and keep them secure. | Units 3, 4, 5, 7, 8, 10, 12, 18, 19, 20, 22 |
| Identify websites and services that are secure and insecure. | Units 3, 4, 5, 6, 7, 10, 12, 13, 17, 18, 19, 20, 21, 22 |
| Understand the digital policy for a sector. | Units 3, 4, 5, 7, 8, 10, 12, 16, 17, 18, 19, 20, 22 |
| Understand the impact of online data. | Units 1, 2, 3, 4, 5, 7, 8, 9, 10, 15, 17, 18, 19, 20, 21, 22 |
| Understand copyright and intellectual property. | Units 1, 3, 4, 5, 7, 8, 10, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22 |

# Appendix 4 Sustainability framework

| Sustainable development goal | Unit mapping |
|---|---|
| SDG 1: No poverty | |
| SDG 2: Zero hunger | |
| SDG 3: Good health and wellbeing | Units 3, 6, 7, 8, 12, 16, 21 |
| SDG 4: Quality education | Units 1, 2, 4, 7, 13, 15, 16, 18, 19, 20, 21, 22 |
| SDG 5: Gender equality | Unit 16 |
| SDG 6: Clean water and sanitation | |
| SDG 7: Affordable and clean energy | |
| SDG 8: Decent work and economic growth | Units 1, 2, 3, 7, 8, 12, 15, 16, 20, 21 |
| SDG 9: Industry, innovation and infrastructure | Units 1, 2, 4, 5, 7, 8, 10, 12, 13, 17, 18, 19, 20, 22 |
| SDG 10: Reduced inequalities | Units 3, 4, 5, 6, 7, 8, 10, 12, 16, 17, 21, 22 |
| SDG 11: Sustainable cities and communities | Units 8, 10 |
| SDG 12: Responsible consumption and production | Units 4, 9, 10, 12, 17, 22 |
| SDG 13: Climate action | Unit 10 |
| SDG 14: Life below water | |
| SDG15: Life on land | |
| SDG 16: Peace, justice and strong institutions | Units 1, 2, 3, 5, 7, 8, 10, 16, 20, 21 |
| SDG 17: Partnerships for the goals | Units 10, 20 |

# Appendix 5 AI Certifications

This document shows how units in the BTEC International Level 3 qualifications in Artificial Intelligence have been aligned to the Microsoft Azure AI Fundamentals (AI-900) certifications.

**Microsoft Fundamentals Certifications**

The content of this qualification provides a strong foundation for students wishing to prepare for industry-recognised certifications such as Microsoft Azure AI Fundamentals (AI-900), with partial alignment to Microsoft Azure Data Fundamentals (DP-900), Azure Fundamentals (AZ-900), Security, Compliance and Identity Fundamentals (SC-900), and Power Platform Fundamentals (PL-900).

The content of Units 1, 2, 5, 7, 8, 17 and 18 provides substantial alignment to the knowledge domains assessed in Microsoft Azure AI Fundamentals (AI-900).

**Unit 1: Introduction to Artificial Intelligence**
This unit examines AI workloads and considerations.

**Unit 2: Fundamantals of Machine Learning**
This unit examines machine learning fundamentals.

**Unit 5: Ethics in AI**
This unit examines responsible AI principles.

**Unit 7: Natural Language Processing (NLP)**
This unit examines natural language processing workloads.

**Unit 8: Computer Vision Basics**
This unit examines computer vision workloads.

**Unit 17: Creating Chatbots**
This unit examines conversational AI/Chatbots.

**Unit 18: AI Tools and Platforms**
This unit examines generative AI concepts.

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