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qualifications



## Apprenticeships

## Digital

Employability  
Enterprise

English &amp; Maths

ESOL

## Personal & Social Development

## Vocational

## Qualification Specification:

Gateway Qualifications Level 4 Award in Advanced Data Analytics with  
Artificial Intelligence – Low Code

This qualification specification covers the following qualification:

| Qualification Number | Qualification Title                                                                                     |
|----------------------|---------------------------------------------------------------------------------------------------------|
| <b>610/6306/X</b>    | Gateway Qualifications Level 4 Award in Advanced Data Analytics with Artificial Intelligence – Low Code |

| Version and date | Change detail             | Section/Page Reference |
|------------------|---------------------------|------------------------|
| 1.0 July 2025    | New specification created |                        |

Qualification Specification:  
Gateway Qualifications Level 4 Award in Advanced Data Analytics with  
Artificial Intelligence – Low Code

## About this qualification specification

Gateway Qualifications is a nationally regulated Awarding Organisation that supports education and training providers through its strong relationships, adaptability and expert team.

This qualification specification contains everything you need to know about this qualification and should be used by everyone involved in the planning, delivery and assessment of the Level 4 Award in Advanced Data Analytics with Artificial Intelligence – Low Code.

This document should be read in conjunction with the Gateway Qualifications' Centre Handbook and other publications available on the website, which contain more detailed guidance on assessment and quality assurance practice.

In order to offer this qualification, you must be a Gateway Qualifications recognised centre and be approved to offer this qualification.

If your centre is not yet recognised, please contact our Business Development team to discuss becoming a Gateway Qualifications recognised centre:

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Website: [Gateway Qualifications](https://www.gatewayqualifications.org.uk)

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## Introduction

As organisations increasingly seek to unlock the value of data, the ability to move beyond basic analysis and build scalable, automated solutions is becoming essential. The Level 4 Award in Advanced Data Analytics with Artificial Intelligence – Low Code has been developed to meet this demand, empowering learners to apply low-code techniques, programming fundamentals, and AI-assisted tools to real-world data challenges.

This qualification builds on foundational data literacy and introduces learners to practical skills in Python, SQL, and machine learning. It supports progression into roles where data modelling, workflow automation, and insight generation are central to business success. Learners will work with real and simulated datasets to develop dashboards, automate processes, and evaluate the ethical use of AI in analytics.

The Level 4 Award in Advanced Data Analytics with Artificial Intelligence – Low Code has been developed in partnership with digital industry experts.

## Qualification Overview

### 1.1 Qualification purpose

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The Level 4 Award in Advanced Data Analytics with Artificial Intelligence - Low Code is designed for professionals who already use no-code tools and want to deepen their capabilities with low-code techniques and gain a solid grounding in programming in industry-leading languages such as Python and SQL. It is equally suited to those currently in employment and to individuals who are reskilling, between jobs, or seeking their first role in data.

For employed learners, the award is applied, hands-on, and focused on immediate workplace impact. Participants use real datasets to clean, transform, model, and visualise insights, developing low-code solutions that automate workflows, improve data quality, and deliver dashboards that support faster and more reliable decision-making.

For those who are unemployed or reskilling, the award provides the same practical and employer-driven skills through curated datasets and simulated business scenarios. Learners can apply techniques to examples from industries they know, such as retail, manufacturing, or services, building a portfolio that strengthens employability and demonstrates the ability to transfer prior experience into data analytics contexts.

This qualification is also designed to augment the skills of professionals in other fields, enabling them to move beyond the limitations of no-code approaches. It gives roles such as finance professionals, digital marketers, HR analysts, or operations managers the ability to automate data preparation, manage larger and more complex datasets, and create refreshable dashboards that directly inform business decisions. Generative AI is introduced as an assistive capability throughout, supporting tasks such as code troubleshooting, hypothesis generation, data cleaning, SQL query creation, model selection, and ethical risk mitigation. Learners are encouraged to evaluate the appropriate use of AI in practice, enhancing productivity and confidence.

By successfully achieving this qualification, learners will gain the confidence to work with data effectively, automate analysis workflows using low-code tools, and communicate insights clearly. The award provides a strong foundation for progression into more advanced qualifications in data analytics with AI, or into digitally enabled roles where programming, data management, and intelligent automation are used to drive decision-making and operational efficiency.

### 1.2 Aims and objectives

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The aims and objectives of the qualification are to:

- Build learners' confidence and fluency in using low-code tools and introductory Python for data tasks
- Develop competence in statistics, machine learning, and ethical data practice
- Strengthen analytical thinking and business communication skills
- Introduce key database and data pipeline techniques with SQL
- Enable learners to use AI-supported tools to accelerate insight generation and improve analysis workflows.
- Prepare learners for progression into further data education or digitally-enabled employment.

### 1.3 Key Information

| Qualification summary          |                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------|
| Qualification title            | Gateway Qualifications Level 4 Award in Advanced Data Analytics with Artificial Intelligence - Low Code |
| Qualification type             | VRQ                                                                                                     |
| Qualification number           | 610/6306/X                                                                                              |
| Learning aim reference number  | 6106306X                                                                                                |
| Level                          | 4                                                                                                       |
| Guided learning hours (GLH)    | 45                                                                                                      |
| Total qualification time (TQT) | 70                                                                                                      |
| Credit value                   | 7                                                                                                       |
| Sector subject area            | 6.1 Digital technology (practitioners)                                                                  |
| Age appropriateness            | 19+                                                                                                     |
| Grading scale                  | Pass/Fail                                                                                               |
| Assessment method              | Portfolio of Evidence                                                                                   |
| Regulation information         | This qualification is regulated by Ofqual for use in England and Qualifications Wales for use in Wales. |

### 1.4 Entry requirements

Learners are expected to have experience using spreadsheets and no-code analytics tools. They should also have a solid grounding in basic statistical techniques, including:

- descriptive statistics
- basic probability
- fundamental data handling techniques
- the fundamentals of data visualisation

If learners wish to progress to this qualification without taking the Award in Foundations of Data Analytics with Artificial Intelligence - No Code, they must demonstrate suitable prior experience or learning and be proficient at least to a Level 2 in English and Maths.

The award is suited both to those in employment, where skills can be applied directly to workplace data and decision making, and to those reskilling, between jobs, or seeking their first data-related role. In the latter case, learners can work with curated datasets and simulated business examples to demonstrate their capability and build a portfolio that supports employability.

Qualification Specification:

Gateway Qualifications Level 4 Award in Advanced Data Analytics with Artificial Intelligence – Low Code

Centres must ensure that learners have the correct information and advice when selecting qualifications to ensure that the qualification will meet their needs.

Centres must ensure that this qualification suits the age and abilities of their learners by ensuring that learners can meet the relevant literacy, numeracy, digital, and health and safety requirements of the qualification.

Learners enrolled on this qualification should not undertake another qualification at the same level with a similar title or content, as this could impact funding eligibility due to duplicated learning.

Centres are responsible for registering learners via the Gateway Qualifications' online registration portal Quartz. Learner registration guidance is available on our website, [Registering learners](#).

## 1.5 Progression opportunities

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On completion of this qualification, learners will be equipped with the knowledge, skills and understanding related to Advanced Data Analytics with Artificial Intelligence with Low Code.

Successful completion of the Level 4 Award in Advanced Data Analytics with Artificial Intelligence – Low Code will allow learners to progress onto:

- Gateway Qualifications Level 4 Certificate in Professional Practice in Data Analytics with Artificial Intelligence
- Gateway Qualifications Level 4 Diploma in Data Analytics with Artificial Intelligence
- Other Level 4 and 5 qualifications in Data Analysis/Analyst
- Level 4 Data Analyst apprenticeship
- Level 4 Business Analysis apprenticeship
- Entry-level support roles in data-enabled teams (e.g., business support, marketing, administration)

A full in-depth careers information, advice and guidance session should be completed for learners before, during and after completion of learning, finding them the most appropriate progression pathways unique to them and based on their ability and aspirations.

## 1.6 Equity, diversity and inclusion

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At Gateway Qualifications, we aim to create an environment which celebrates differences and strives for equitable opportunities and outcomes for all. More than a mere commitment, this Equity, Diversity, and Inclusion Policy stands as a framework, informing every aspect of the work we do. It is our aim to support our staff and learners of all abilities, ensuring the development, delivery, and awarding of qualifications in a fair and inclusive manner.

Whilst developing our qualifications, we have given due consideration to eliminating discrimination, harassment and victimisation, advancing equality of opportunity, and fostering good relations between people who share a relevant protected characteristic (as defined in the Equality Act 2010) and those who do not.

For full details, please see the [Equity, Diversity and Inclusion Policy](#).

## **1.7 Support materials and resources**

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In addition to this qualification specification, the following resources are available for centres approved to offer the qualification:

- Sample assignment briefs for each unit
- Sample assignment checklists for each unit
- Sample resource guides for each unit
- Sample data (where required)

## **1.8 Achieving this qualification**

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The qualification will be awarded to learners who successfully demonstrate their achievement of all learning outcomes of the units of the qualification and satisfy the rules of combination.

The knowledge, skills and understanding that will be assessed as part of the qualification are set out within the unit details.

To be awarded this qualification, learners must successfully achieve both mandatory units.

## Mandatory units

| Unit    | Unit title                                      | Unit reference | Credit value | GLH |
|---------|-------------------------------------------------|----------------|--------------|-----|
| Unit 01 | Foundations of Data Analytics with Python       | K/651/7409     | 3            | 20  |
| Unit 02 | Databases with SQL, Ethics and Machine Learning | D/651/7414     | 4            | 25  |

## 2. Assessment

### 2.1 Assessment overview

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#### Portfolio of evidence only

The qualification is assessed through a portfolio of evidence, which is internally assessed by centre staff and externally quality assured by Gateway Qualifications. For more information, please see the [Centre Guide to Best Practice in Internal Assessment](#).

Each learner must build a portfolio of evidence generated from appropriate assessment tasks which demonstrates achievement of all the learning outcomes associated with each unit through practical, work-related tasks.

Assessment guidance is provided for each unit. Assessors may use alternative assessment methods as long as they are fit for purpose, meet the requirements of the qualification and ensure the integrity of the assessment process.

On completion of each unit, learners must declare that the work produced is their own, and the Assessor must countersign this.

Should a learner not achieve the required standard to pass an assessment, further teaching and learning should take place before attempting the assessment again.

The qualification will be awarded to learners who successfully demonstrate their achievement of all learning outcomes of the units of the qualification.

For learners who are not successful in achieving the whole qualification but still achieve any full unit, a unit certificate of achievement may be awarded.

The knowledge, skills and understanding that will be assessed as part of the qualification are set out within the unit details.

### 2.2 Assessment language

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This qualification will be assessed in English. All learners' work must be in English. British Sign Language can be used where it is permitted for the purpose of a reasonable adjustment.

### 3. Unit Details

#### 3.1 Mandatory units

##### Unit 01 – Foundations of Data Analytics with Python

|                        |                                                                                                                                                                                                                                                                                    |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit Reference:</b> | K/651/7409                                                                                                                                                                                                                                                                         |
| <b>Unit Summary:</b>   | This unit introduces learners to the foundational concepts and practical skills needed to perform data analytics using Python. Learners will explore core statistical ideas, basic programming techniques, and essential methods for preparing and transforming data for analysis. |
| <b>GLH:</b>            | 20                                                                                                                                                                                                                                                                                 |
| <b>Credit Value:</b>   | 3                                                                                                                                                                                                                                                                                  |
| <b>Grading Method:</b> | Pass/Fail                                                                                                                                                                                                                                                                          |

| LEARNING OUTCOMES                                                                       | ASSESSMENT CRITERIA                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The learner will:                                                                       | The learner can:                                                                                                                                                                                                                                     |
| 1. Be able to demonstrate core Python programming skills for data analytics.            | 1.1. Clarify the use of Python variables, data types, and control structures<br>1.2. Apply basic operations<br>1.3. Explain how data structures and libraries like NumPy and Pandas are used for data manipulation and analysis.                     |
| 2. Be able to apply statistical concepts and techniques to explore and interpret data.. | 2.1 Analyse data and apply appropriate statistical concepts to practical scenarios<br>2.2 Demonstrate an understanding of descriptive and inferential techniques and their use in real-world data problems.                                          |
| 3. Be able to demonstrate data handling in the context of data science.                 | 3.1 Explain how effective data handling contributes to accurate analysis and model development.<br>3.2 Demonstrate proficiency in data cleaning, feature engineering, and data transformation.<br>3.3 Classify different data preprocessing methods. |

#### Delivery Guidance: Foundations of Data Analytics with Python

##### Learning Outcome 1:

##### Python variables, data types, and control structures (AC 1.1):

- Python programming, focusing on using control structures (if statements, loops) and data structures (lists, tuples, dictionaries) to manage and filter data collections

- Learners will explore conditional logic and loops to repeat tasks.
- Working with lists, tuples, and dictionaries to organise and process data. Integrating statistical results into structured Python data structures for further analysis.

**Applying basic operations (AC 1.2):**

- Arithmetic Operations from Python's math module
- String Operations: concatenation, formatting with f-strings, string methods to contextualise the calculations
- Comparison and Logical: equality and inequality operators, greater than and less than and boolean
- Built-in Functions

**Data structures and libraries (NumPy and Pandas) for manipulation and analysis (AC 1.3):**

- NumPy Fundamentals:
  - Array: quick array manipulation, statistical calculations, data aggregation, and correlation analysis.
- Pandas Essentials:
  - Data Selection: To easily manage, transform, and analyse structured data for data-driven insights.
  - Basic Operations: data loading, exploration, manipulation, and analysis using data structures like DataFrames and Series.
- Integration Benefits: NumPy for efficient array computations, Pandas for data manipulation and analysis

**Learning Outcome 2:****Analysing data and applying statistical concepts to practical scenarios (AC 2.1):**

- Understanding Hypothesis Testing and Statistical Significance: This introduces the concept of hypothesis testing, focusing on the null and alternative hypotheses, p-values, and significance testing. Learners will explore ANOVA, T, and Chi-square tests, applying these methods to real-world datasets to evaluate statistical significance. Using spreadsheets, they will conduct statistical tests and calculate confidence intervals to assess the reliability of the data and identify trends.
- Key areas of focus: Understanding p-values, significance levels, and hypothesis formulation. Conducting ANOVA, T-tests, and Chi-square tests to determine statistical significance.
- Applying confidence intervals to assess the reliability of conclusions. Performing hypothesis testing in spreadsheets and other tools.
- Central Tendency Measures: calculating mean, median, mode, and when to use each measure
- Dispersion Measures: variance, standard deviation, range calculations, interquartile range (IQR), and when to use them
- Correlation Analysis: Pearson correlation, interpreting correlations, causation vs correlation warning
- Practical Applications: customer behaviour analysis, sales trend identification, quality control metrics, risk assessment, performance benchmarking

**Descriptive and inferential techniques for real-world problems (AC 2.2):**

- Descriptive Statistics Implementation:
  - Differentiating descriptive and inferential statistics. Introduction to data visualisation (histograms, box plots).
  - Calculate descriptive statistics and create visualisations in a shared virtual environment.
  - Create and interpret visualisations in spreadsheets to identify patterns, trends, and outliers.

- Link visual outcomes to statistical concepts, such as central tendency and variability.
- Inferential Statistics Basics:
  - Sampling Concepts: sample vs population, sample size considerations, sampling bias awareness
  - Hypothesis Testing Introduction: null and alternative hypotheses, t-tests, p-value interpretation, confidence intervals, Type I and II errors
- Real-World Problem-Solving: A/B testing scenarios, customer segmentation, predictive analytics basics, quality assurance, business forecasting

**Learning Outcome 3:****How effective data handling contributes to accurate analysis and model development (AC 3.1):**

- Data Quality Impact: garbage in, garbage out principle, accuracy and reliability, bias prevention, decision-making implications
- Data Integrity Principles: consistency maintenance, completeness requirements, validity checks, uniqueness constraints, timeliness considerations
- Business Value: cost of poor data quality, ROI from data cleaning, competitive advantages, regulatory compliance, stakeholder trust
- Best Practices: documentation standards, version control basics, testing procedures, validation protocols, quality metrics

**Proficiency in data cleaning, feature engineering, and data transformation (AC 3.2):**

- Handling missing data, outliers, and inconsistencies using Python or BI tools.
- Data wrangling techniques using Pandas and NumPy for high-performance processing.
- Handling categorical and numerical data transformations
- Exploratory Data Analysis (EDA) as part of the data cleaning pipeline.

**Classifying different data preprocessing methods (AC 3.3):**

- Cleaning Methods Classification:
  - Removal Methods: dropping nulls, removing duplicates, outlier elimination, feature selection, row/column filtering
  - Imputation Methods: statistical filling, forward/backward fill, interpolation, model-based imputation, domain-specific rules
  - Correction Methods: format standardisation, typo fixing, unit conversion, date parsing, encoding fixes
- Feature Engineering:
  - Creates new features and combines datasets using pandas functions or BI tools to produce a unified and enriched dataset.

**Assessment guidance:****AC1 (Learning Outcome 1):**

**Type of evidence:** Python code in a Jupyter notebook, Exam

**Assessment criteria:** 1.1, 1.2, 1.3

**Additional information:** Write Python code to apply machine learning solutions to solve complex problems and enhance decision-making. Identify the correct Python package libraries for the task and evaluate your solution code. No complex programming required - focus on understanding and applying basics. Use hands-on problem-solving to test your

**Assessment guidance:**

ability to apply the skills you have learned. Assess understanding of core concepts and theoretical knowledge.

**AC2 (Learning Outcome 2):**

**Type of evidence:** Statistical analysis project, Exam

**Assessment criteria:** 2.1, 2.2

**Additional information:** Complete statistical analysis of business dataset, demonstrating both descriptive and inferential techniques. Conduct a simple hypothesis test (t-test) and interpret the results in a business context. Build a basic linear regression model using a Python ML package with interpretation of coefficients and R-squared.

**AC3 (Learning Outcome 3):**

**Type of evidence:** Python code in a Jupyter notebook, Exam

**Assessment criteria:** 3.1, 3.2, 3.3

**Additional information:** Write Python code to apply machine learning solutions to solve complex problems and enhance decision-making. Justify the algorithm used and evaluate your solution code. No complex programming required - focus on understanding and applying basics. Use hands-on problem-solving to test your ability to apply the skills you have learned. Assess understanding of core concepts and theoretical knowledge.

## Unit 02 – Databases with SQL, Ethics and Machine Learning

|                        |                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit Reference:</b> | D/651/7414                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Unit Summary:</b>   | This unit introduces learners to key concepts and practical skills in working with databases using SQL, alongside an understanding of ethical and responsible data use. Learners will develop the ability to store, retrieve and manage data using SQL queries, and will explore the importance of data privacy, governance, and clear communication when handling information. |
| <b>GLH:</b>            | 25                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Credit Value:</b>   | 4                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Grading Method:</b> | Pass/Fail                                                                                                                                                                                                                                                                                                                                                                       |

| LEARNING OUTCOMES                                                                                           | ASSESSMENT CRITERIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The learner will:                                                                                           | The learner can:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1. Be able to demonstrate effective data management techniques.                                             | 1.1 Explain how an SQL database can be used to manage data.<br>1.2 Classify SQL statements used for data manipulation and aggregation.<br>1.3 Demonstrate the ability to execute SQL queries to retrieve and manipulate data.<br>1.4 Explain the role of database relationships.<br>1.5 Classify different join types, including Left, Right, Inner & Outer Join.<br>1.6 Explain the syntax, structure, and common data types used in SQL to support effective interaction with relational databases. |
| 2. Be able to demonstrate knowledge of key machine learning principles and apply models using Python.       | 2.1. Demonstrate an understanding of machine learning concepts, algorithms, and their applications.<br>2.2. Develop practical skills in implementing and evaluating machine learning models using Python.                                                                                                                                                                                                                                                                                             |
| 3. Understand the significance of data standards, legal and regulatory frameworks for responsible data use. | 3.1. Describe the importance of data standards, legal frameworks, and regulatory compliance.<br>3.2. Explain their role in ensuring ethical, secure, and responsible data handling.                                                                                                                                                                                                                                                                                                                   |
| 4. Be able to design and execute a basic data analysis project.                                             | 4.1. Demonstrate the ability to plan, execute, and document a complete data analysis project.<br>4.2. Communicate complex technical information clearly and concisely to both technical and non-technical stakeholders.                                                                                                                                                                                                                                                                               |

|  |                                                                                                                                                                                                             |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>4.3. Generate meaningful visualisations and insights from data using appropriate statistical concepts.</p> <p>4.4. Draw conclusions based on data insights to justify an informed business decision.</p> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Delivery Guidance: Databases with SQL, Ethics and Machine Learning

#### Learning Outcome 1:

##### How SQL databases can be used to manage data (AC 1.1):

- Fundamental concepts of relational databases.
- Through ERDs and understanding how tables relate to each other, learners gain insight into the structure and organisation of data.
- Key concepts include tables, rows, columns, and primary and foreign keys. Overview of database structures: How data is stored, organised, and retrieved efficiently.
- Real-World Context: Databases include Customer Relationship Management (CRM), inventory management, and library systems.
- Use case: How businesses rely on relational databases to manage large volumes of structured data.
- Business Applications: customer relationship management (CRM), inventory management systems, e-commerce platforms, financial transaction processing, reporting and analytics, data warehousing

##### SQL statements for data manipulation and aggregation (AC 1.2):

- What is SQL (Structured Query Language), and why is it essential for databases?

##### Executing SQL queries to retrieve and manipulate data (AC 1.3):

- Explanation of key SQL components: SELECT, FROM, WHERE, and ORDER BY.
- Demonstrates basic SQL commands on an online SQL platform
- Understand the purpose and syntax of basic SQL commands. Be able to write and execute SQL queries to retrieve, filter, and sort data from relational databases.
- Debug SQL queries effectively.

##### Role of database relationships (AC 1.4):

- Relationship Types: one-to-one relationships (user profiles), one-to-many relationships (customers-orders), many-to-many relationships (students-courses), self-referencing relationships (employee-manager)
- Foreign Keys: referential integrity enforcement, cascade operations, relationship constraints, preventing orphaned records, maintaining consistency
- Entity-Relationship Concepts: entities as tables, attributes as columns, relationships as foreign keys, ER diagram basics

##### Classify different join types, including Left, Right, Inner & Outer Join (AC 1.5):

Joins in SQL are essential for combining data from two or more tables based on related columns. They enable us to retrieve meaningful insights from relational databases by merging data points that share a common relationship.

SQL Joins combine data from multiple tables based on related columns.

Joins merge and retrieve related data for analysis.

Use case: Joins enable integrated analysis across tables.

**Explain the syntax, structure, and common data types used in SQL to support effective interaction with relational databases (AC 1.6):**

SQL queries are made up of statements and clauses. The SELECT, FROM, and WHERE clauses are fundamental building blocks of SQL queries.

Use case: specify what data you want, where to find it, and how to narrow it down to what's relevant.

Data types define the kind of data that can be stored in a column, ensuring accurate storage and efficient querying.

Understanding data types ensures accuracy, optimises performance, and supports scalability by storing data efficiently and preventing errors.

SQL structure, syntax, and data types give the ability to handle and analyse data effectively.

Use case: solve real-world problems quickly and efficiently, making SQL an essential skill for data professionals.

**Learning Outcome 2:****Machine learning concepts, algorithms, and applications (AC 2.1):**

- Overview of supervised learning models and classification techniques.
- Decision Trees and Random Forest algorithms, and their role in decision-making processes.
- Strengths and weaknesses of classification methods in predictive analytics.
- Model evaluation metrics (accuracy, precision, recall, and F1-score) and how they impact decision-making.
- Ethical concerns in classification, including bias in datasets and challenges to interpretability.
- Business Applications: customer churn prediction, sales forecasting, fraud detection, recommendation systems, sentiment analysis, predictive maintenance

**Implementing and evaluating ML models using Python (AC 2.2):**

- Scikit-learn Basics: model import and instantiation, fit and predict methods, split to train and test, normalisation, pipeline creation
- Overview of unsupervised learning models and clustering techniques.
- Understanding K-Nearest Neighbours (KNN) and K-Means Clustering for Pattern Recognition. Techniques for determining the optimal number of clusters using the elbow method and silhouette analysis. Comparing hierarchical clustering and K-Means for different business scenarios.
- Practical industry applications of clustering, including customer segmentation and anomaly detection.
- Ethical challenges in clustering include the risks of biased grouping and misinterpreting clustering results.
- Evaluation Metrics:
  - Classification Metrics: accuracy score, confusion matrix, precision and recall, F1 score,
  - Regression Metrics: mean squared error (MSE), root mean squared error (RMSE), mean absolute error (MAE), R-squared score,
- Learners will engage in practical exercises to build and refine classification and clustering models using real-world datasets.
- They will analyse model outputs and interpret results to understand predictive accuracy and generalisability.
- Special emphasis will be placed on understanding bias within datasets and its impact on AI-driven predictions.
- Understand both technical and ethical considerations.

**Learning Outcome 3:****Importance of data standards, legal frameworks, and regulatory compliance (AC 3.1):**

- Principles of ethical data use, focusing on balancing business goals with social responsibility.
- Examine real-world examples to understand the impact of unethical practices.
- Learn how ethical decision-making builds trust and safeguards an organisation's reputation, and learners will be better equipped to apply these principles in their workplace.
- Ensuring Responsible Data Management: This lesson focuses on GDPR compliance and data governance frameworks.
- Learners will explore legal standards and strategies for managing data responsibly.
- They will gain practical insights into creating governance policies that protect data, ensure compliance, and minimise risks, enabling them to implement strong, transparent data practices in their organisations.

**Role in ensuring ethical, secure, and responsible data handling (AC 3.2):**

- Key principles: Transparency, fairness, accountability, and privacy.
- Real-world examples of ethical failures (e.g. biased AI models, privacy breaches).
- Data Governance: Understanding frameworks for responsible data handling.
- Role of governance in protecting sensitive data and ensuring compliance
- Learners will understand the importance of ethical decision-making and governance in data analytics and apply ethical principles to real-world problems.
- Overview of data protection regulations.
- Consequences of non-compliance: Fines, lawsuits, and reputational damage.
- Learners will be able to identify compliance risks and understand how to handle data ethically and legally in professional analytics projects.

**Learning Outcome 4:****Planning, executing, and documenting a complete data analysis project (AC 4.1):**

- Project Planning Phase: hypotheses and business goals
- Data Collection and Preparation: SQL database queries, data extraction processes, cleaning with Python, joining multiple sources, and quality validation
- Analysis Execution: exploratory data analysis, statistical testing, machine learning application, results validation, iterative refinement, performance metrics
- Documentation Standards: code comments, analysis notebooks, results summary, lessons learned

**Communicating complex technical information to stakeholders (AC 4.2):**

- Technical Audience Communication: Statistical significance.
- Non-Technical Translation: Explain the real-world significance of a statistical test or data distribution

**Generating meaningful visualisations and insights using statistical concepts (AC 4.3):**

- An introduction to data visualisation in Python using visualisation packages for creating informative plots.
- Create visualisations like line, bar, box plots, and histograms to uncover data trends and patterns.
- Interpret and communicate data insights effectively.
- Insight Generation: pattern identification, anomaly detection, trend analysis, comparative analysis, predictive insights, segment analysis
- Tools and Libraries: matplotlib and seaborn

**Drawing conclusions to justify informed business decisions (AC 4.4):**

- Draw conclusions from probabilities
- Draw conclusions from statistical test results for Hypotheses

- Draw conclusions from data distributions
- Draw conclusions from the results of an ML model prediction
- Understand the ML test results' impact on decisions

**Assessment guidance:****AC1 (Learning Outcome 1):**

**Type of evidence:** SQL query results, Exam

**Assessment criteria:** 1.1, 1.2, 1.3, 1.4, 1.5, 1.6

**Additional information:** Create an SQL database with multiple tables. Populate the table with data and then answer a series of business scenario questions using SQL queries.

**AC2 (Learning Outcome 2):**

**Type of evidence:** Machine learning project notebook, Exam

**Assessment criteria:** 2.1, 2.2

**Additional information:** In a Jupyter Notebook, create a predictive model to answer a real-world business scenario. With Python, load a dataset, prepare it, train the model, and evaluate it. Communicate why the algorithms and variables used were chosen.

**AC3 (Learning Outcome 3):**

**Type of evidence:** Machine learning project notebook, Exam

**Assessment criteria:** 3.1, 3.2

**Additional information:** Identify ethical issues in your dataset and any ethical consequences in your model predictions.

**AC4 (Learning Outcome 4):**

**Type of evidence:** Jupyter Notebook, SQL project, Statistical project, Exam

**Assessment criteria:** 4.1, 4.2, 4.3, 4.4

**Additional information:** Draw conclusions from statistical test results for hypotheses in your stats project. Draw conclusions from the results of the ML model prediction in your Notebook. Draw conclusions based on the predictions from the ML model evaluation results. Report the results of your SQL queries.

### 3.2 Explanation of assessment terms used in this qualification

| Term                    | Definition                                                                                                                                                                                                                                                             |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Analyse</b>          | Break the subject or complex situations into separate parts and examine each part in detail; identify the main issues and show how the main ideas are related to practice and why they are important; reference to current research or theory may support the analysis |
| <b>Apply</b>            | Explain how existing knowledge can be linked to new or different situations, or in practice                                                                                                                                                                            |
| <b>Clarify</b>          | Explain the information in a clear, concise way, showing depth and understanding                                                                                                                                                                                       |
| <b>Classify</b>         | Organise according to a specific criteria                                                                                                                                                                                                                              |
| <b>Communicate</b>      | Convey, receive or exchange spoken or written information                                                                                                                                                                                                              |
| <b>Demonstrate</b>      | Apply skills in a practical situation and/or show a detailed understanding of the topic                                                                                                                                                                                |
| <b>Describe</b>         | Provide a broad range of detailed information about the topic or item in a logical way                                                                                                                                                                                 |
| <b>Develop</b>          | Identify, build and extend a topic, plan or idea                                                                                                                                                                                                                       |
| <b>Draw conclusions</b> | Make a final decision or judgment based on reasons which could lead to recommendations                                                                                                                                                                                 |
| <b>Explain</b>          | Apply reasoning to account for how something is or to show understanding of underpinning concepts; responses could include examples to support the reasons                                                                                                             |
| <b>Generate</b>         | Create/produce ideas                                                                                                                                                                                                                                                   |

## 4. Quality Assurance

As the portfolio of evidence is assessed by the centre's assessor, the centre must operate an internal quality assurance process. This ensures that qualification standards are being applied consistently within a centre through training, standardisation, sampling of marking and feedback.

### 4.1 Internal quality assurance

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Centres should refer to the online [Centre Handbook](#) for further guidance on staffing requirements.

A centre's internal quality assurance process is led by the Internal Quality Assurer (IQA), who is responsible for identifying and promoting best practices in teaching, learning, and assessment. They are responsible for:

- monitoring assessment practices to ensure they meet our standards.
- sampling assessment decisions and learner work to verify accuracy and consistency.
- observing assessors and tutors, providing feedback and support for improvement.
- facilitating standardisation meetings to align assessment practices across teams.
- supporting assessors with professional development and guidance.
- identifying and promoting best practices in teaching, learning, and assessment.
- handling appeals and complaints related to assessment outcomes.
- maintaining detailed records for audits and external quality assurance visits.

The portfolio of evidence is subject to internal quality assurance whereby a centre regularly samples and evaluates its assessment practices and decisions, and acts on the findings to ensure consistency and fairness.

**To ensure the integrity of the internal quality assurance process, Internal Quality Assurers (IQAs) must not quality assure work that they have assessed.**

Assessors must ensure fair assessment and equality of opportunity for the learner within the assessment process. In order to ensure that the assessor is making judgements that are consistent with the rest of the assessment team, they must meet regularly with other assessors and internal quality assurers to discuss assessment decisions.

### 4.2 Sampling

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Sampling is a key element of the internal quality assurance process whereby the IQA:

- uses a risk-based approach to determine what to sample and when.
- checks the quality and consistency of each assessor's decisions.
- maintains a common standard of marking within the centre over time.
- applies methods like vertical sampling (same unit across assessors), horizontal sampling (multiple units from one learner), and diagonal sampling (across units and learners).
- ensures sampling covers all units over time, not just at the end of the assessment process.

### 4.3 Internal standardisation

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Internal standardisation is a collaborative process by which tutors and assessors within a centre consider work that they have assessed and, using pre-determined criteria, reach a common agreement on standards as being typical of work at a particular level or grade by comparing samples and providing peer evaluation.

The process of internal quality assurance provides an opportunity for assessors to receive feedback and support, which can help improve their assessment skills. It fosters a culture of continuous improvement and professional development among teaching and assessment staff.

Standardisation will be facilitated by the Centre's IQA and should include all those involved in assessing learner evidence. Centre standardisation events should be held at regular intervals. Centres will be required to keep records of each internal standardisation event, including the date, attendees and notes on any outcomes and actions. Centres will be required to store these records securely for three years, and Gateway Qualifications may ask to see them as part of the centre's quality assurance and monitoring activities.

### 4.4 External quality assurance

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The external quality assurance process for this qualification takes a risk-based approach where external monitoring visits are carried out to review the internal quality systems of centres against key quality standards.

External quality assurance falls into two categories, the first being the quality assurance of the centre's policies and procedures (Centre monitoring) as detailed below, with the second being external sampling of the assessment decisions at qualification level.

### 4.5 Centre Monitoring

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Centre monitoring is undertaken by an External Quality Assurer (EQA) allocated to the centre. The EQA plays a critical role in the Gateway Qualifications approach to centre assessment standards scrutiny as they are responsible for:

- Validating the centre's procedures for delivery of qualifications and assessment.
- Completing reports for each visit with clear action points where needed.
- Carrying out an annual compliance visit.
- Risk rating centres on the above.

The EQA will carry out an initial risk assessment at the centre recognition stage and then annually on an ongoing basis and will give a high/medium/low-risk.

The EQA will arrange the annual quality monitoring visits. These visits:

- Monitor the centre's compliance with the centre recognition terms and conditions by reviewing programme documentation and meeting managers and centre staff.
- Identify any staff development needs.
- Ensure that all procedures are being complied with through an audit trail, and make sure that the award of certificates of achievement to learners is secure.

The EQA will contact the centre in advance of a visit. However, Gateway Qualifications reserves the right to undertake unannounced visits, including during assessment times.

## 4.6 Quality assuring centre assessment decisions

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The external quality assurance process for this qualification involves a risk-based approach where sampling of assessment decisions and internal quality assurance activity to ensure that qualification standards are maintained.

An External Quality Assurer (EQA) will be allocated to the centre to sample the centre's assessment decisions, who will consider whether the sample provides evidence of the following:

- that the standard set out in the units is evidenced and assessment decisions are applied consistently.
- appropriate teaching, stimulus, support, or learning materials and resources.
- an appropriate internal quality assurance strategy and sampling plans.
- appropriate and consistent feedback provided by the assessor to the learner, and by the IQA to the assessor.

A report will be completed by the EQA and made available to the Centres once the sampling activity has been completed.

## 4.7 Malpractice and Maladministration

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Malpractice is any deliberate activity, neglect, default or other practice that compromises the integrity of the assessment process and/or the validity of certificates. It covers any deliberate actions, neglect, default or other practice that compromises or could compromise:

- the assessment process
- the integrity of a regulated qualification
- the validity of a result or certificate
- the reputation and credibility of Gateway Qualifications
- the qualification to the public at large

Centre staff should be familiar with the [Malpractice and Maladministration Policy and Procedure](#).

## 4.8 Direct claim status

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Direct claim status (DCS) is a status given to centres on an individual qualification basis and allows centres to claim certification without waiting for an external quality assurance activity to take place.

DCS is permitted for this qualification. Refer to the [Direct Claims Status page for further details](#).

## 4.9 Recognition of prior learning

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Recognition of Prior Learning enables recognition of achievement from a range of activities through the knowledge, understanding or skills that learners already possess and so do not need to develop these through a course of learning.

The use of RPL is permitted for this qualification.

#### **4.10 Reasonable adjustments and special considerations**

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Reasonable adjustments are centre permitted, for details on this Centres should refer to the [Reasonable Adjustments and Special Considerations Centre Guidance](#)

For learners who require special consideration at the point of assessment, complete a Special Consideration Request Form.

#### **4.11 Appeals**

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Learners who wish to appeal about their assessment results or a decision affecting their learning should either be supported by their Centre or should have exhausted their Centre's own appeals process before appealing to Gateway Qualifications. In the latter case, learners must provide Gateway Qualifications with evidence that they have first appealed to their Centre.

Centres and learners should refer to the [Appeals policy](#) for further information.

## 5. Glossary of terms

This section provides a concise compilation of frequently used terms and acronyms within our organisation and the broader educational context.

| Term                                  | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Guided Learning Hours (GLH)</b>    | Is the amount of direct contact time a Learner has with immediate guidance or supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training. This cannot be unsupervised study, preparation for study or time used for assessments.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Total Qualification Time (TQT)</b> | <p>Is the number of notional hours which represents an estimate of the total amount of time that could be reasonably expected to be required for a Learner to achieve and demonstrate the achievement of the level of attainment necessary for the award of the qualification.</p> <p>Total Qualification Time is comprised of the following two elements:</p> <ul style="list-style-type: none"> <li>the number of hours which an awarding organisation has assigned to a qualification for Guided Learning, and</li> <li>an estimate of the number of hours a Learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place by – but, unlike Guided Learning, not under the Immediate Guidance or Supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training.</li> </ul> |



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