

SEVERN BUSINESS COLLEGE

Qualifi Level 4 Diploma in Artificial Intelligence

Course Handbook

Qualification
Qualifi Level 4 Diploma in Artificial Intelligence

Ofqual Number
610/3934/2

Level
4

Total Qualification Time
1200

Credit Value
120

Aim of the Course
The aim of the Qualifi Level 4 Diploma in Artificial Intelligence is to to equip students with understanding of AI concepts and applications at an entry level. The diploma covers a range of topics, including the history and principles of AI, machine learning, data science, deep learning, AI ethics, and practical AI applications. Students will gain hands-on experience with popular AI tools and develop programming skills in languages like Python. The Diploma emphasises ethical considerations and responsible AI development. It typically includes project work to apply AI knowledge to real-world challenges and prepares students for careers in AI development, data science, machine learning engineering, or further academic pursuits in the field. Assessment methods include exams, assignments, and project evaluations to ensure an understanding of AI principles and their practical application.

Assessment
Assessment is through practical assignments, with no exams - to more accurately reflect the real working environment.

Course Structure

Qualifi Level 4 Diploma in Artificial Intelligence			
Unit number	**Units**	**Unit level**	**Unit credit**
R/651/0599	Introduction to Artificial Intelligence and Applications	4	20
F/651/0600	Mathematical Foundations for Machine Learning	4	20
H/651/0601	Data Science Using Python	4	20
J/651/0602	Big Data Management	4	20
K/651/0603	Introduction to Deep Learning	4	20
L/651/0604	Artificial Intelligence Ethics	4	20

Assessment Grades

Marks Ranges %	**Assessment Criteria**
Fail (0-39)	Insufficient information about each assessment criteria
Pass (40-59)	Describe main ideas with evidence on each assessment criteria
Merit (60-69)	Evaluation of ideas with evidence on each assessment criteria
Distinction (70-100)	Critical evaluation of ideas with evidence on each assessment criteria
No Marks	Plagiarism

UNIT SPECIFICATIONS

Unit Title
Introduction to Artificial Intelligence and Applications

Level
4

Learning Time Hours
200

Credit Value
20

Unit aim

This unit will provide students with a fundamental understanding of Artificial Intelligence (AI) and is an introductory unit for the Diploma in Artificial Intelligence Application. Students will gain knowledge of the evolving field of AI and explore the basic theoretical foundation of AI as it is applied in industry.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand the fundamental principles and concepts of AI.	1.1 Explain the principles of AI and the associated technologies 1.2 Assess the impact of AI technologies on society 1.3 Explain the function and purpose of the key AI models and Neural networks.
2. Understand trending AI applications and technologies used within industry.	2.1 Explain trending AI application used in different industries 2.2 Discuss how these AI applications are implemented and the benefits to industry
3. Apply key trending AI tools to simple business scenarios	3.1 Assess AI trending tools used within industry and the challenges faced in implementing these technologies 3.2 Discuss possible impact from such application of the trending AI tools.
4.Understand how AI can be used to address future sustainable society needs	4.1: Describe society's future needs in respect of sustainability 4.2: Review how AI applications can be optimized to address society's needs responsibly and sustainably.

Suggested Resources

- Taulli, T., (2019), Artificial Intelligence Basics: A Non-Technical Introduction, Apress
- Lowe, A. & Lawless, S., (2021) Artificial Intelligence Foundations (BCS, The Chartered Institute for IT)
- Rialzul, S.M., (2023), AI in Everyday Life: Tools and Applications Paperback (Independently published)

UNIT SPECIFICATIONS

Unit Title

Mathematical Foundations for Machine Learning

Level

4

Learning Time Hours

200

Credit Value

20

Unit aim

In this unit students will explore the essential mathematical principles that form the bedrock of modern machine learning. The unit covers core concepts such as linear algebra, calculus, probability, and statistics, providing a mathematical foundation for understanding machine learning algorithms and techniques. Students will develop the skills needed to translate problems into mathematical models and communicate solutions effectively. Students will quantify business solutions to a given complex dataset.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand the role of maths and statistics in Machine Learning.	1.1 Explain probability and its importance in business analytics. 1.2 Calculate the probability of specific outcomes in given business scenarios. 1.3 Classify with reasons, a given data as qualitative or quantitative
2. Understand statistical methods and tools for data analysis.	2.1 Explain the concept of inferential statistics and its role in business decision-making. 2.2 For a given business case, explain a hypothesis that can be used to outline a statistical test to validate it. 2.3 Interpret the results of hypothesis tests in the context of business analytics.
3. Be able to integrate statistical methods in solving business challenges.	3.1 Describe linear regression in analytics. 3.2 Compute a simple linear regression model using a provided dataset

	3.3 Interpret the coefficients based on multiple regression analysis on a given dataset. 3.4 Solve problems using derivatives (Product Rule, Quotient Rule) in business-related scenarios.
4. Be able to propose business solutions based on inferential statistics results.	4.1 Solve integral problems using trigonometric functions, exponentials, and logarithms, and explain their relevance in business contexts. 4.2 Discuss the concept of computational complexity and its implications in data processing. 4.3 Analyze a given complex dataset and interpret the results using appropriate statistical methods

Suggested Resources

- Deisenroth, M. P., (2020), Mathematics for Machine Learning (Cambridge University Press)
- Wilmott, P., (2019), Machine Learning: An Applied Mathematics Introduction (Panda Ohana)

UNIT SPECIFICATIONS

Unit Title

Data Science Using Python

Level

4

Learning Time Hours

200

Credit Value

20

Unit aim

This unit introduces students to data science through the Python programming language. It covers fundamental Python programming concepts, data analysis techniques, and the use of Python libraries such as Pandas, NumPy, and Matplotlib for data manipulation and visualization. Students will learn how to apply Python to real-world data science problems, exploring topics such as machine learning algorithms, data wrangling, and exploratory data analysis. Students will have the opportunity to carry out projects to apply learned concepts in practical scenarios. Throughout the unit, the focus is on understanding and applying statistical methods for data analysis, ensuring a strong foundational skill set for aspiring data scientists.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand Python for data analysis	1.1 Describe Python fundamentals and data science concepts 1.2 Write a small Python script on basic operations like variable assignments, loops, and conditionals
2. Be able to convert a given dataset to derive insights using data visualization	2.1 Organize a given dataset using Pandas before performing basic manipulations. 2.2 Convert cleaned dataset into a series of visualizations to showcase different types of plots. 2.3 Interpret the results from the visualizations.
3. Be able to apply basic machine learning concepts using Python	3.1 Apply statistical methods to a dataset with emphasis on concepts like mean, median, mode, variance 3.2 Explain the results of the statistical summary and visual exploration on a chosen dataset.
4. Be able to analyze data to solve a given real-world data science problem.	4.1 Compare provided statistical methods and choose one to interpret its dataset 4.2 Present insights on the given real-world data science problem

Suggested Resources

- Grus, J., (2019) Data Science from Scratch: First Principles with Python (O'Reilly Media)
- Shah, C., (2020) A Hands-On Introduction to Data Science (Cambridge University Press)
- Dasgupta, M., (2022) Practical Data Science Using Python (Packt Publishing)

UNIT SPECIFICATIONS

Unit Title
Big Data Management

Level
4

Learning Time Hours
200

Credit Value
20

Unit aim
This unit introduces students to the key concepts and characteristics of big data technologies, data mining, visualization, real-world applications, and ethical implications in the field of big data analytics. Students will explore big data and its crucial role in today's data-driven landscape and the structured to provide understanding and practical expertise in managing and analyzing extensive datasets. Students will develop an understanding of big data fundamentals and gain hands-on experience of using cutting-edge technologies. The unit aims to equip students with the necessary skills and knowledge to excel in the rapidly evolving field of big data analytics. Students will apply their knowledge and skills to a comprehensive dataset and present their data analysis.

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand what constitutes big data and its importance.	1.1 Explain the Big Data concepts and characteristics, and basic understanding of. 1.2 Describe the basic aspects of Hadoop and NoSQL databases 1.3 Assess the evolution of Big Data technologies and their impact on modern businesses.
2. Be able to use technologies and tools in big data analytics	2.1 Select and use appropriate technologies and tools to carry out practical coding or a process a dataset. 2.2 Interpret a given dataset using basic data mining techniques and present findings.
3. Be able to apply techniques for mining, processing, and analyzing large datasets.	3.1 Describe the algorithms for classification, clustering, and association rule mining in processing datasets. 3.2 Use tools to summarize data visualizationbased on a given dataset. 3.3 Interpret results from data visualization for specific industry to highlight business insights.
4. Be able to review applications of big data in different key industries.	4.1 Compare the ethical implications and privacy concerns in Big Data in different industries 4.2 Carry out data analysis on a comprehensive dataset including ethical considerations 4.3 Present the results of the data to highlight business insights, predictions, or strategies.

Suggested Resources
- Gressel, S. & Pauleen, D., (2020) Management Decision-Making, Big Data and Analytics (Sage)
- Ghavam, P., (2020) Big Data Management: Data Governance Principles for Big Data Analytics (De Gruyter)

UNIT SPECIFICATIONS

Unit Title
Introduction to Deep Learning

Level
4

Learning Time Hours
200

Credit Value
20

Unit aim
In this unit learners will develop an understanding of the principles and applications of deep learning. They will revisit concepts associated with data science and machine learning before exploring key concepts relating to neural networks. Students will have the opportunity to practice solving real-life business problems using various neural network models and, subsequently, to analyse the results from such models. Students will use their knowledge and skills to evaluate the results of an image classification model and suggest how deep learning models can be improved.

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand basic machine learning concepts that apply when developing deep learning models.	1.1 Explain key concepts in machine learning 1.2 Explain the process of data preparation / cleansing. 1.3 Discuss the functions of classifier and ensemble in Machine Learning.
2. Understand how to develop basic deep learning models.	2.1 Explain key concepts of deep learning models 2.2 Assess the use of these key concepts in deep learning modelling.
3. Be able to apply Neural network models to carry out simple tasks using popular frameworks.	3.1 Describe the purpose and deliverable outcome of Neural network models used in deep learning 3.2 Select an appropriate Neural network model for an image classification. 3.3 Model a selected Neural network model onto a given dataset.
4. Be able to interpret results using prepared sample data to preprocess deep learning models.	4.1 Select appropriate metric to evaluate the results of an image classification model 4.2 Analyse the results produced and summarize how the deep learning model can be further improved

Suggested Resources
- Trask, A., (2019) Grokking Deep Learning (Manning)
- Charniak, E., (2019) Introduction to Deep Learning (Mit Press)
- Glassne, A., (2021) Deep Learning: A Visual Approach (No Starch Press)
- Zhang, A., Lipton, Z., Li, M., (2023) Dive into Deep Learning (Cambridge University Press)

UNIT SPECIFICATIONS

Unit Title
Artificial Intelligence Ethics

Level
4

Learning Time Hours
200

Credit Value
20

Unit aim
In this unit learners will develop an understanding of ethical considerations and principles in relation to the development, deployment, and impact of AI. Students will discuss various industrial case studies to appreciate the ethical challenges associated with AI systems. They will identify dilemmas and express their views on possible conflicting outcomes. They will gain knowledge and skills to address ethical issues and explore factors to consider in making informed and responsible decisions. Students will have the opportunity to compare and analyse the various AI regulatory landscapes as advocated by global governmental agencies

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria

1. Associate impact of AI on society with established ethical principles.	1.1 Discuss the key concept of AI and its impact on society. 1.2 Assess how to address human ethics and morality in AI deployment
2. Understand Ethical frameworks and principles in relation to AI deployment.	2.1 Explain the various elements of AI ethical frameworks 2.2 Review implementation of AI ethical framework and principles in current AI applications.
3. Understand mitigation in addressing bias, privacy, and security in AI application.	3.1 Explain the impact of bias, privacy, and security in AI application 3.2 Review the existing methods to identify, examine and mitigate bias, privacy, and security issues in AI systems.
4. Understand the governance and regulation of AI ethics.	4.1 Explain the responsibilities of government and industries to improve and regulate AI governance. 4.2 Compare the difference in global AI governance, including reasons for the differences

Suggested Resources

- Floridi, L., (2023) The Ethics of Artificial Intelligence: Principles, Challenges, and Opportunities (Oxford University Press)
- Coeckelbergh, M., (2020) AI Ethics (MIT Press)
- Adjei, A. T., (2023) AI Ethics: Navigating the Moral Dilemmas of AI: A Comprehensive Guide to Ethical AI Principles, Accountability, and Fairness Responsible Technology Ethics (Independent)

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