



Awarding
Great British
Qualifications

LEVEL 5 EXTENDED DIPLOMA IN COMPUTING WITH DATA SCIENCE (L5EDC DS)

NCC Education
Qualification Unit Specification
2025 / 26



LEVEL 5 EXTENDED DIPLOMA IN COMPUTING WITH DATA SCIENCE (L5EDC DS)

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1. About NCC Education

NCC Education is a UK-based awarding body, active in the UK and internationally. Originally part of the National Computing Centre, NCC Education started offering IT qualifications in 1976 and from 1997 developed its Higher Education portfolio to include Business qualifications, IT qualifications for school children and a range of Foundation qualifications.

With Centres in over fifty countries, four international offices and academic managers worldwide, NCC Education strives to employ the latest technologies for learning, assessment and support. NCC Education is regulated and quality assured by Ofqual (the Office of Qualifications and Examinations Regulation, see (www.ofqual.gov.uk) in England.

2. Why choose this Qualification

NCC Education's Level 5 Extended Diploma in Computing with Data Science is:

- **Regulated** by Ofqual and Qualification Wales (QiW) and listed on the Qualifications and Credit Framework. The Regulated Qualifications Framework (RQF) is a credit-based qualifications framework, allowing candidates to take a unit-based approach to building qualifications.

For more information see:

<https://www.gov.uk/what-different-qualification-levels-mean/list-of-qualification-levels>

- **Quality assured** and well established in the UK and worldwide.
- **Recognised and valued** by employers and universities worldwide.

The NCC Education Level 5 Extended Diploma in Computing with Data Science (L5EDC DS) makes up the second year of the NCC Education degree journey and builds upon the knowledge gained during the NCC Education Level 4 Diploma in Computing (L4DC).

The qualification will explore areas of in-demand computing including artificial intelligence, data analysis, agile development, and professional and career development in IT.

- **Objective**

Candidates will study a balance of academic and vocational subjects in order to provide them with the necessary knowledge and skills to play a significant role in IT organisations.

3. Structure of the L5EDC DS Qualification

Qualification Title, Credits, Units

NCC Education Level 5 Extended Diploma in Computing with Data Science (RQF):

- **Credits: 160**
- **Total Qualification Time: 1600 hours**
- **Guided Learning Hours: 459 hours**

Please see Section 6 below for Syllabuses, which include the Guided Learning Hours and Total Qualification Time for each Unit of the Level 5 Extended Diploma in Computing with Data Science.

Candidates must pass 8 Core Units to be awarded the Level 5 Extended Diploma in Computing with Data Science certificate.

Core Units

Artificial Intelligence (TQT: 200 hours/ 20 credits)	Introduction to Data Science and Big Data (TQT: 200 hours/ 20 credits)
Data Analysis and Visualisation with Python (TQT: 200 hours/ 20 credits)	Business IT Project (TQT: 200 hours/ 20 credits)
Agile Development (TQT: 200 hours/ 20 credits)	Analysis, Design and Implementation (TQT: 200 hours/ 20 credits)
Professional and Career Development in IT (TQT: 200 hours / 20 credits)	IT Project Management (TQT: 200 hours / 20 credits)

4. Assessment for the Qualification

4.1 Assessment Objectives

All assessment for the qualification is intended to allow candidates to demonstrate that they have met the relevant Learning Outcomes. Moreover, NCC Education's assessment is appropriate to the assessment criteria as stated in this specification and is regularly reviewed to ensure it remains consistent with the specification.

4.2 Overview of the Qualification Unit Assessment

Unit	Assessment Methods	
	Global Assignment	Global Exam
Agile Development	100%	
Analysis, Design and Implementation	100%	
Artificial Intelligence	100%	
Data Analysis and Visualisation with Python	100%	
Introduction to Data Science and Big Data	50%	50%
Professional and Career Development in IT	100% (CV, CPD Plan & career aspirations, mock interview)	
IT Project Management	100% (Case Study)	
Business IT Project	100%	

5. Administration

5.1 Assessment Cycles

Four assessment cycles are offered throughout the year Spring, Summer, Autumn and Winter. Details of each assessment cycle with corresponding dates can be found within the Activity Schedules.

Examination dates and assignment submission deadlines are published in the NCC Education Activity Schedule, which is provided to Centres by Customer Services. It is also available on Quartz, NCC Education's student registration system.

The Activity Schedule also gives the key dates for registering candidates for assessment cycles, the dates when Centres can expect the assessment documentation and ultimately, the assessment results from NCC Education.

5.2 Language of Assessment

All assessment is conducted in English.

5.3 Candidates

NCC Education's qualifications are available to those Centre candidates who satisfy the entry requirements as stated in this specification.

5.4 Qualification Entry Requirements

For entry onto the NCC Education L5EDC DS qualification students must have at least one of the following:

- NCC Education Level 4 Diploma in Computing (L4DC)

OR

- A local or international qualification which is deemed to be of a similar level to the NCC Education L4DC qualification. This must be agreed with NCC Education in advance.

If a potential student whose first language is not English, they will need to obtain a valid score of 5.5 or above in the International English Language Testing System (IELTS) examination or equivalent.

Alternatively, take the free NCC Education Higher English Placement Test, which is administered by our Accredited Partner Centres.

Direct Entry at Other Points

Many students are expected to join the NCC Education Computing journey at Level 4 or earlier.

However, applications will be accepted for entry at any point and will be accepted, by means of documented evidence, using the following criteria:

- The applicant's general educational background is appropriate for the level of entry.
- The applicant's knowledge of computing is both equivalent to and appropriate for the level of entry.

5.6 Eligibility Period

The maximum period of time that NCC Education allows for the completion of your programme is three years. Please contact your Accredited Partner Centre if you have any queries relating to this.

5.7 Re-sits

If a candidate fails an assessment, they will be provided with opportunities to re-sit during the eligibility period.

Candidates may only seek reassessment in a previously failed Unit.

6 Syllabus

1. Business IT Project

Title	Business IT Project
Unit reference number	F/652/2239
Credits	20
Level	5
Type	Core

Guided Learning Hours	24 hours	Total Qualification Time	200 hours
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Learning Outcomes; The Learner will:	Assessment Criteria; The Learner can:
1. Identify and analyse a system, issue or problem of current interest within the context of computing and Web	1.1 Describe the problem / issue and project rationale, together with its context. 1.2 Articulate the project aims and objectives.
2. Manage the project effectively demonstrating systematic and effective planning, progress monitoring, reflection and use of time and resources	2.1 Identify appropriate method and tools. 2.2 Produce a project plan. 2.3 Identify and prioritise project risks. 2.4 Monitor and evaluate progress against a project plan.
3. Conduct an in-depth investigation of the context and where appropriate, literature and other similar products	3.1 Plan and undertake research activities in an appropriate and systematic way. 3.2 Explain the research methods used and their limitations in terms of validity and reliability. 3.3 Evaluate research material. 3.4 Synthesise a course of action from the evaluation of material.
4. Employ appropriate methods, tools and techniques to achieve the project aims and objectives	4.1 Select and justify the use of methods, techniques and tools. 4.2 Employ and appropriately document the use of methods, techniques and tools.
5. Systematically evaluate the activities undertaken to fulfil the aim of the project	5.1 Identify success criteria and judge strengths and weaknesses of the project process and outcomes. 5.2 Reflect on the process of conducting the project, identifying learning achieved. 5.3 Articulate and demonstrate the outcomes of the project.

Syllabus			
Topic No	Title	Proportion	Content
1	Introduction	1/12 2 hours project session 2 hours of tutorials	• Choosing your project • Typical and appropriate projects • Planning your project • Selecting methods • Risk management • Your Project Proposal Learning Outcomes: 1 & 2
2	Research	1/12 2 hours project session 2 hours of tutorials	• Research methods, purpose, validity, reliability, primary and secondary research, Data collection and analysis • What does research mean for the Business IT Project? ○ Exploring the problem: background ○ Exploring methods of solution and alternatives ○ Documenting Research • Finding appropriate information • Requirements gathering & specification Learning Outcome: 3
3	Methods of solution	1/12 2 hours project session 2 hours of tutorials	• Types of Project: ○ Software construction, ○ Data Science, ○ Research. • Software Development Project Methods: ○ Analysis, Design, modelling. ○ Constructing a solution. • Data Science Methods. • Research Project methods. Learning Outcomes: 4

4	Testing and evaluation	1/12 2 hours project session 2 hours of tutorials	• Testing ○ Explain the purpose and types of testing. ○ Unit tests/ Integration tests/ System tests/ Acceptance Tests ○ Validity & Verification ○ Develop appropriate test plan. ○ Documenting tests (in YOUR project) • Evaluation of your project ○ Evaluation criteria ○ Reflecting on learning Learning Outcome: 5
5	Planning the final report	1/12 2 hours project session 2 hours of tutorials	• Structure of Final Report. • Content of Final Report. • Citations and Referencing. • Appropriate Appendices. • Presentation requirements. • Assessment criteria. Learning Outcomes: 1 -5
6 -12	Project and Report Completion	7/12 112 hrs Private study 4 hours (minimum) meetings with tutor	• Private study time should include weekly supervision meetings with your tutor to discuss your progress. • Project production. • Project presentation. Learning Outcomes: 1 - 5

Related National Occupational Standards (NOS)

Sector Subject Area: ICT Practitioners

Related NOS: TECHDUBI1, TECHDUBI2, TECHDUBI3, TECHDUCO1, ESKITU062, ESKITU050

Assessments

Global Assignment (100%)

2. Data Analysis and Visualisation with Python

Title	Data Analysis and Visualisation with Python
Unit reference number	D/651/1087
Credits	20
Level	5
Type	Core

Guided Learning Hours	58 hours	Total Qualification Time	200 hours
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Learning Outcomes; The Learner will:	Assessment Criteria; The Learner can:
1. Demonstrate knowledge and apply principles of data science to analyse business problems	1.1 Explain the purpose and benefits of data science. 1.2 Explain the key technologies of data analytics. 1.3 Apply data analysis to solve business problems.
2. Be able to produce, comprehend and run Python code using Jupyter Notebook	2.1 Make effective use of the features of Jupyter Notebook to execute Python programs. 2.2 Understand the fundamentals of Python. 2.3 Create programs to solve simple problems.
3. Be able to analyse and interpret data using relevant Python packages	3.1 Load, clean and transform raw data for better understanding, decision making and timely analysis using Pandas. 3.2 Perform statistical analysis techniques to make data-driven decisions using Pandas and Numpy. 3.3 Construct and interpret simple linear regression models and decision tree classifiers.
4. Create effective visualisations using Matplotlib and Seaborn	4.1 Present data attractively using Matplotlib and Seaborn. 4.2 Create static and interactive visualisations with Matplotlib. 4.3 Choose appropriate chart types to accurately represent different types of data.
5. Apply data analysis and visualisation techniques to real-world datasets	5.1 Apply appropriate data analysis techniques to real-world datasets. 5.2 Construct and interpret simple linear regression models and decision tree classifiers. 5.3 Use appropriate visualisation techniques to communicate insights of data clearly.

Syllabus			
Topic No	Title	Proportion	Content
1	Introduction to Data Analytics and Analytics Tools	1/12 2 hours of lectures 2 hours of tutorials	- What are data analytics? - Tools used for data analytics - Benefits of data analytics for today's businesses Learning Outcome: 1
2	Introduction to Jupyter Notebook	1/12 2 hours of lectures 2 hours of tutorials	- Set up Jupyter Notebook - Create a notebook - Run python scripts - Interface - Terminologies
3	Introduction to Python I	1/12 2 hours of lectures 3 hours of laboratory	- Functions, conditional statements, logic - Exception handling - Data types Learning Outcome: 2
4	Introduction to Python II	1/12 2 hours of lectures 3 hours of laboratory	- Loops - List - Dictionary - Debugging Learning Outcome: 2
5	Working with Numpy Array	1/12 2 hours of lectures 3 hours of laboratory	- Numpy Array Object - Data types, axis, shape - Slice a subset of data - Data manipulation - Broadcasting - Arithmetic functions - Basic statistical functions - Reading from/writing to file Learning Outcomes: 3, 5
6	Statistical Fundamentals	1/12 2 hours of lectures 3 hours of laboratory	- Types of variables - Measures of central tendency - Measures of dispersion - Normal distribution Learning Outcome: 3, 5

7	Getting Started with Pandas	1/12 2 hours of lectures 3 hours of laboratory	• Creating Series and DataFrame • Selection • Subsetting • Data cleaning techniques Learning Outcome: 3,5
8	Simple Linear Regression	1/12 2 hours of lectures 3 hours of laboratory	• Simple Linear Regression • Error term (residual), slope, intercept • Ordinary Least Square (OLS) • Scatter plot • Regression plot • Interpretation of the model • Assumptions for regression • Prediction • R-squared and its limitations Learning Outcomes: 3,5
9	Decision Tree for Classification	1/12 2 hours of lectures 3 hours of laboratory	• Decision Tree terminologies and components • Constructing a tree • Entropy • Information Gain • Gini Index • Dividing a dataset • Overfitting • Python scikit-learn Learning Outcomes: 3, 4, 5
10	Data Visualisation	1/12 2 hours of lectures 3 hours of laboratory	• Matplotlib • Seaborn • Line chart • Scatter chart • Various bar charts • Box plot • Heatmap • Good practice Learning Outcomes: 4,5
11	Classification in Machine Learning	1/12 2 hours of lectures 3 hours of laboratory	• Types of machine learning algorithms • Outliers • Feature scale • Cross Validation • Imbalanced data • Common evaluation metrics Learning Outcomes: 3, 5

12	Unit Summary	1/12 2 hours of lectures 3 hours of laboratory	• Data cleaning • Basic statistical analysis • Simple linear regression • Decision tree for classification • Use examples to illustrate these concepts <i>Learning Outcomes: All</i>
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Related National Occupational Standards (NOS)

Sector Subject Area: ICT Practitioners

Related NOS: TECHDUBI2, TECHDUDA2, TECIS806301, ESKITU052, ESKITU061, ESKITU070

Assessments

100% Global Assignment

3. Agile Development

Title	Agile Development
Unit reference number	R/652/2243
Credits	20
Level	5
Type	Core

Guided Learning Hours	60 hours	Total Qualification Time	200 hours
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Learning Outcomes; The Learner will:	Assessment Criteria; The Learner can:
1. Understand the background to Agile development	1.1 Summarise the background to Agile development. 1.2 Explain Agile development in relation to other development approaches.
2. Understand the roles within an Agile development team	2.1 Explain the roles in an Agile development team. 2.2 Evaluate the need for a particular role within an Agile development team for a particular project scenario.
3. Understand the various Agile development techniques	3.1 Explain the various Agile development techniques. 3.2 Evaluate the need for a particular Agile development technique for a particular project scenario.
4. Understand an Agile development lifecycle	4.1 Describe an Agile development lifecycle. 4.2 Explain the documentation required to support an Agile development lifecycle. 4.3 Evaluate the use of an Agile development lifecycle for a particular project scenario.
5. Understand the principles associated with an Agile development approach	5.1 Describe the principles associated with an Agile development approach.

6. Be able to apply an Agile development approach to a particular project scenario	6.1 Describe how to apply an Agile development approach to a particular problem scenario. 6.2 Suggest and justify the members of an Agile development team for a particular project scenario. 6.3 Suggest and justify the use of particular Agile development techniques for a particular project scenario. 6.4 Define a document set to support an Agile development approach for a particular project scenario. 6.5 Populate a document set to support an Agile development approach for a particular project scenario.
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Syllabus			
Topic No	Title	Proportion	Content
1	An Overview of Agile	1/12 2 hour of lectures 2 hours of seminars 1 hour of tutorials	• An introduction and overview of the Agile Development unit • What is Agile? - the history • What Agile Approaches Learning Outcomes: 1 & 5
2	The Agile Approach and Principles	1/12 2 hours of lectures 2 hours of seminars 1 hour of tutorials	• What is DSDM? • Philosophy of Agile and benefits • The 8 principles • The 5 key techniques • The Instrumental success factors • The Project Approach Questionnaire Learning Outcomes: 1 & 5
3	Modelling	1/12 2 hours of lectures 2 hours of seminars 1 hour of tutorials	• What is a model? • Links to the 8 principles • Viewpoints for modelling • Modelling within the Agile lifecycle Learning Outcomes: 3 & 6

4	Roles, Skills and Team Structures	1/12 2 hours of lectures 2 hours of seminars 1 hour of tutorials	• Agile team style (self-directing, empowered) • Agile team size and reasons • Project level roles and responsibilities • Solution Development Team roles and responsibilities • Specialist roles and other supporting roles Learning Outcomes: 2 & 6
5	Lifecycle and Products	1/12 2 hours of lectures 2 hours of seminars 1 hour of tutorials	• The purpose of the configurable lifecycle • The 5 main phases and the two further phases of the lifecycle • For each phase: – Objectives – Preconditions – Points to consider • Products related to lifecycle phases • The three essential perspectives for the products Learning Outcomes: 4 & 6
6	Project Management Considerations Part 1: Control Risk	1/12 2 hours of lectures 2 hours of seminars 1 hour of tutorials	• Key differences in style between Traditional and Agile project management • Control parameters in an Agile project • Communication including daily Stand Ups • Empowerment and escalation • Risk in an Agile project Learning Outcomes: 1, 2 & 6
7	Project Management Considerations Part 2: Quality and Testing	1/12 2 hours of lectures 2 hours of seminars 1 hour of tutorials	• Configuration management • Quality and maintainability • Testing concepts • Metrics Learning Outcomes: 1, 2 & 6
8	Facilitated Workshops	1/12 2 hours of lectures 2 hours of seminars 1 hour tutorials	• What is a Facilitated workshop? • The role of the Facilitator; co-facilitator/scribe; participants. • Workshop planning • Workshop success factors Learning Outcomes: 6

9	Requirements Definition and Prioritisation	1/12 2 hours of lectures 2 hours of seminars 1 hour tutorials	• What is a requirement in Agile? • Defining requirements: User story format (as a... I need... in order to...) • Functional and non-functional requirements • Format and content of a requirement • The Prioritised Requirements List • MoSCoW as a key technique • Requirements and modelling Learning Outcomes: 6
10	Iterative Development and Prototyping	1/12 2 hours of lectures 2 hours of seminars 1 hour tutorials	• What is a prototype? • What is iterative development? • Prototyping perspectives: – Functional – Usability – Non-functional – Capability/Technique prototype: Architectural Spike and Proof of Concept • Horizontal, Vertical and Combined development strategies • Prototyping: Identify, plan, evolve, review. • Iterative development as a key technique Learning Outcomes: 6
11	Estimating and Timeboxing	1/12 2 hours of lectures 2 hours of seminars 1 hour tutorials	• The estimating process • Factors affecting an estimate • Estimating approaches • Problems with estimates • What is a timebox? • Timebox structure (Identify, plan, evolve, review) • Timebox links to MoSCoW and requirements • Delivery (increment) planning • Timebox planning • Timeboxing as a key technique Learning Outcomes: 6

12	Unit Summary and Revision Guidance	1/12 2 hours of lectures 2 hours of seminars 1 hour tutorials	Revision <i>Learning Outcomes: All</i>
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Related National Occupational Standards (NOS)

Sector Subject Area: ICT Practitioners

Related NOS: TECIS805401, TECIS805301, TECIS806401

Assessments

Global Assignment (100%)

4. Analysis, Design and Implementation

Title	Analysis, Design, and Implementation
Unit reference number	M/652/2242
Credits	20
Level	5
Type	Core

Guided Learning Hours	60 hours	Total Qualification Time	200 hours
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Learning Outcomes; The Learner will:	Assessment Criteria; The Learner can:
1. Understand the seamless transition from OO analysis to OO design	1.1 Explain the seamless transition from OO analysis to OO design. 1.2 Identify and describe OO analysis models. 1.3 Identify and describe OO design models.
2. Understand how to convert OO analysis and design models to code	2.1 Explain how to convert OO analysis models to code. 2.2 Explain how to convert OO design models to code.
3. Understand the quality attributes associated with an OO development	3.1 Explain the developer software quality attributes. 3.2 Explain the user software quality attributes.
4. Understand the concept of maintenance within an OO development environment	4.1 Describe what is meant by maintenance of software. 4.2 Identify and define the different types of software maintenance.
5. Be able to produce OO analysis and design models using a case tool	5.1 Use a case tool to produce OO analysis models based on a case study. 5.2 Use a case tool to develop OO design models based on a case study.
6. Be able to convert OO analysis and design models to code using an appropriate IDE	6.1 Use an IDE to develop code based on an OO analysis model. 6.2 Use an IDE to develop code based on an OO design model.

Syllabus			
Topic No	Title	Proportion	Content
1	Introduction to the module	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Introduction to the module • Distinction between analysis and design • The Software Crisis • Recap of key OO concepts Learning Outcomes: 1
2	Paper Prototyping	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Paper prototyping overview • How to do it • What you learn • Why it's useful Learning Outcomes: 1, 2 & 3
3	User Centred Design	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Introduction to UCD • Mental Models • Personas Learning Outcomes: 5 & 6
4	Agile Object Orientation	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Discussion of the OO software development process • Use-case diagrams • Discussion of benefits of OOAD • Discussion of drawbacks of OOAD • OOAD in an agile world Learning Outcomes: 1 & 5

5	Static Analysis and Design	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Requirements gathering • Identifying abstractions • Candidate classes • Class diagrams • Converting class diagrams into code Learning Outcomes: 1 & 5
6	Dynamic Analysis and Design	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Activity diagrams • Sequence diagrams • Converting dynamic models into code Learning Outcomes: 1 & 5
7	Design Case Study	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Worked example from problem statement to design Learning Outcomes: 1, 3 & 5
8	Design Patterns (1)	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Introduction to design patterns • Factory • Abstract Factory Learning Outcomes: 2, 3 & 4
9	Design Patterns (2)	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Introduction to design patterns • Factory • Abstract Factory Learning Outcomes: 2, 3 & 4

10	Elements of Good Design	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Software quality attributes • Software component design • Coupling • Cohesion • The Observer design pattern Learning Outcomes: 3 & 5
11	Redesign and Implementation	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Redesign of case study • Incorporation of design patterns • Implementation of elements of previous design • case study into code Learning Outcomes: 2 & 6
12	Maintenance	1/12 2 hours of lectures 2 hours of laboratory sessions 1 hour of tutorials	• Impact of change • Refactoring • Refactoring case study Learning Outcomes: 4

Related National Occupational Standards (NOS)

Sector Subject Area: ICT Practitioners

Related NOS: ESKITP4034, ESKITP4074, ESKITP5034, ESKITP5035

Assessments

Global Assignment (100%)

5. Artificial Intelligence

Title	Artificial Intelligence
Unit reference number	H/651/0322
Credits	20
Level	5
Type	Core

Guided Learning Hours	60 hours	Total Qualification Time	200 hours
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Learning Outcomes; The Learner will:	Assessment Criteria; The Learner can:
1. Understand the importance of AI and its applications	1.1 Explain the meaning of AI and its origin. 1.2 Identify the characteristics of AI. 1.3 Discuss the limitations and ethics of AI. 1.4 Discuss current and future developments in the field of AI and its applications.
2. Apply a range of well-established AI search strategies and knowledge representation techniques in problem solving	2.1 Construct simple state spaces. 2.2 Select and apply appropriate search techniques in problem solving. 2.3 Explain and identify different types of knowledge. 2.4 Apply knowledge representation using the logical, semantic network, frame and production rules techniques.
3. Assess a range of well-established techniques for reasoning with uncertain knowledge	3.1 Explain the concept of uncertainty. 3.2 Explain the source of uncertain knowledge. 3.3 Discuss and apply probabilistic reasoning using the Bayes' rule and the certainty factor theory.
4. Understand a range of machine learning techniques	4.1 Explain machine learning. 4.2 Compare and contrast supervised learning, unsupervised learning and reinforcement learning. 4.3 Identify and apply suitable machine learning techniques in problem solving.
5. Understand the range of AI techniques that are being applied in industry or research	5.1 Describe the key players, components, characteristics and limitations of expert systems. 5.2 Apply reasoning techniques in rule-based expert systems. 5.3 Explain natural language processing and its components. 5.4 Discuss a range of applications using natural

	language processing. 5.5 Explain intelligent agents and PEAS. 5.6 Discuss a range of applications using intelligent agents.
6. Implement and evaluate a range of AI models and techniques for solving real-world problems	6.1 Select suitable tools and techniques for use in designing AI models. 6.2 Construct an AI model. 6.3 Evaluate the performance of AI models.

Syllabus			
Topic No	Title	Proportion	Content
1	Introduction to AI	1/12 2.5 hours of lectures 2.5 hours of exercises	• Definitions • History of AI • Characteristics of AI • Limitations of AI • Ethics in AI • Current and future development of AI and its applications Learning Outcome: 1
2	Problem Solving Using Search	1/12 2.5 hours of lectures 2.5 hours of exercises	• Problem representation in state space • Strategies for state space search • Uninformed search (blind search) • Informed search (heuristic Search) Learning Outcome: 2
3	Knowledge Representation	1/12 2.5 hours of lectures 2.5 hours of exercises	• Types of knowledge • Logical representation • Semantic network representation • Frame representation • Production Rules Learning Outcome: 2
4	Uncertain Knowledge	1/12 2.5 hours of lectures 2.5 hours of exercises	• Uncertainty and its sources • Basic probability • Bayes' rule • Bayesian reasoning • Certainty factors Learning Outcome: 3
5	Fuzzy Logic	1/12 3 hours of lectures 3 hours of exercises	• Fuzzy logic • Linguistic variables • Fuzzy sets and operations • Fuzzy rules • Fuzzy system Learning Outcome: 3

6	Machine Learning	1/12 3 hours of lectures 3 hours of exercises	• Introduction • Supervised learning • Unsupervised learning • Reinforcement learning • Applications of machine learning Learning Outcome: 4
7	Neural Networks	1/12 2 hours of lectures 2 hours of exercises 4 hours of laboratory sessions	• Basic structure • Perceptron • Multilayer neural networks • Backpropagation learning • Accelerated learning • Recurrent neural networks • Learning Outcome: 4, 5
8	Decision Trees	1/12 3 hours of lectures 2 hours of exercise sessions 5 hours of laboratory sessions	• Structure and terminologies • Attribute selection measures • Learning Outcome: 4, 6
9	Genetic Algorithms	1/12 3 hours of lectures 2 hours of exercise sessions	• Simulation of Natural Evolution • Basic genetic algorithms • Learning Outcome: 4

10	Expert Systems	1/12 3 hours of lectures 2 hours of exercise sessions 5 hours of laboratory sessions	• The development team of an expert system • Components of an expert system • Characteristics of an expert system • Rule-based expert system • Learning Outcome: 5, 6
11	Natural Language Processing	1/12 3 hours of lectures 2 hours of exercise sessions 5 hours of laboratory sessions	• Terminologies • Components of natural language processing • Phases in natural language processing • Natural language processing pipeline • Applications of natural language processing • Learning Outcome: 5, 6
12	Intelligent Agents	1/12 3 hours of lectures 2 hours of exercise sessions	• Agents and environments • Rationality • PEAS • Types of intelligent agents • Game Playing • Algorithms in games • Learning Outcome: 5

Related National Occupational Standards (NOS)

Sector Subject Area: ICT Practitioners

Related NOS: TECHDUBI3, TECHDUCW1, TECHDUDL1, ESKITU012, ESKITU020, ESKITU040

Assessments

Global Assignment (100%)

6. Introduction to Data Science and Big Data

Title	Introduction to Data Science and Big Data
Unit reference number	T/651/1093
Credits	20
Level	5
Type	Core

Guided Learning Hours	60	Total Qualification Time	200 hours
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Learning Outcomes The Learner will:	Assessment Criteria The Learner can:
1. Demonstrate a systematic and thorough understanding of the concept of Data Science and Big Data	1.1 Explain the concept of Data Science and Big Data along with the relationship among two. 1.2 Explain the components of Data science. 1.3 Understand the need and applications of Data Science and Big Data. 1.4 Understand the role and responsibility of data scientist, big data expert and data analyst. 1.5 Understand and classify different types of data. 1.6 Understand the data quality and issues.
2. Demonstrate proficiency in data collection, design and modelling for data processing	2.1 Demonstrate a systematic awareness of the theoretical foundations of data processing. 2.2 Understand the Data Science Process Life Cycle. 2.3 Identify problems and tasks involved in the life cycle of a Data Science Project. 2.4 Differentiate between different techniques and tools.
3. Select appropriate techniques and tools for data pre-processing	3.1 Clean and prepare data for analysis. 3.2 Identify abnormalities such as missing values, outliers, redundant features, etc. in data. 3.3 Model data for a purpose. 3.4 Summarise and visualise data using suitable tools.

4. Understand the analytical techniques and software tools to effectively generate insights from data	4.1 Turn raw data into insightful information. 4.2 Understand a range of data analysis techniques and models. 4.3 Identify the suitability of different data analysis techniques for different types of Data. 4.4 Make use of cutting-edge tools and technologies to analyse data. 4.5 Understand the need of model selection and evaluation. 4.6 Understand the metrics and scoring for the evaluation of selected model.
5. Understand the suitability of different visualisation methods for different types of Data	5.1 Build big data analysis solutions with analysis methods and visualisation tools. 5.2 Understand the need of businesses and present data. 5.3 Select appropriate visualisation tools and visualise aspects of the data in each dataset. 5.4 Systematically interpret and evaluate the results of data analysis solution to inform the decision-making process.
6. Demonstrate a critical understanding of Data Science Ethics	6.1 Understand the ethical challenges and concerns in data science. 6.2 Understand the concept of sustainability in data science and how data science can support environmental and social goals. 6.3 Explore practical solutions for implementing responsible data practices. 6.4 Recognise the importance of fostering a culture of data ethics within an organisation.

Syllabus			
Topic No	Title	Proportion	Content
1	Data Science and Big Data Fundamentals	1/12 2 hours of lectures 3 hours of tutorials	• What is Data Science? • What is Big Data? • What are Data Analytics? • Data Science vs Big Data vs Data Analytics • Components of Data Science • Data Science Process/lifecycle Learning Outcome: 1,2
2	Introduction to Data	1/12 2 hours of lectures 3 hours of tutorials	• What is Data? • How big is Big Data? Some examples • Sources of Data • Big Data Challenges • Data quality and issues • 5V's of Big Data • Types of Data: Structured, Unstructured, Semi Structured • Categories of Data Types: Continuous, Categorical, Text Data, Time Series, Binary. Learning Outcome: 1,2
3	Understanding Data & Exploration	1/12 2 hours of lectures 3 hours of lab session	• What is Descriptive Statistic? • What is Inferential Statistic? • What is EDA? Numerical or Graphical methods • Aims of EDA? • Exploratory vs Confirmatory Data Analysis? • Numerical Methods of EDA: Central Tendency, Measurement of Variability • Graphical Methods of EDA: histogram, box plot, scatter plot, stem and leaf plot. Learning Outcome: 2,3,5
4	Data Pre-Processing I	1/12 2 hours of lectures 3 hours of lab session	• What is Data Pre-processing? • Data Pre-processing Importance? • Data Pre-processing Steps • Data Pre-processing examples? • Data Pre-processing Methods • Missing Values • Categorical Encoding • Feature engineering Learning Outcome: 2, 3

5	Data Pre-Processing II	1/12 2 hours of lectures 3 hours of lab session	• Dimensionality Reduction • Outlier analysis • Class imbalance Learning Outcome: 2,3
6	Data Processing I	1/12 2 hours of lectures 3 hours of lab session	• What is Data Processing? • What is AI and its History? • Difference Between AI, ML and Deep learning • Introduction to Machine Learning • Types of Machine Learning: supervised learning, unsupervised learning. Learning Outcome: 1,4
7	Data Processing II	1/12 2 hours of lectures 3 hours of lab session	• Reinforcement learning • NLP • Deep learning Learning Outcome: 4
8	Model Selection and Evaluation	1/12 2 hours of lectures 3 hours of lab session	• What are model selection and model evaluation? • Types of model selection • Metrics and Scoring Learning Outcome: 4
9	Data Visualisation	1/12 2 hours of lectures 3 hours of lab session	• Data Visualisation • Data Visualisation Process • Advanced data visualisation and processing tools Learning Outcome: 4,5
10	Business Intelligence and Tools	1/12 2 hours of lectures 3 hours of tutorials	• What is Business Intelligence? • Benefits of Business Intelligence • Types of BI tools and software • Example of BI case studies Learning Outcome: 1,3,4
11	Data Science Ethical and Privacy Issues	1/12 2 hours of lectures 3 hours of tutorials	• What is Data Science Ethics? • Accountability and Governance • Data Provenance and Aggregation • Sustainability in Data Science Learning Outcome: 6

12	Unit Summary	1/12 3 hours of lectures 2 hours of tutorials	<i>Learning Outcome: ALL</i>
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Related National Occupational Standards (NOS)

Sector Subject Area: ICT Practitioners

Related NOS: TECDT80841, TECDT80842, TECDT80851, TECIS806401, TECIS805301

Assessments

50% Global Assignment

50% Exam

7. Professional and Career Development in IT

Title	Professional and Career Development in IT
Unit reference number	Y/651/1094
Credits	20
Level	5
Type	Core

Guided Learning Hours	77 hours	Total Qualification Time	200 hours
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Learning Outcomes; The Learner will:	Assessment Criteria; The Learner can:
1. Demonstrate a critical understanding of employability attributes	1.1 Explain the skills knowledge & attitudes needed for success in the modern world of work. 1.2 Identify skills and knowledge needed for a specific career.
2. Demonstrate a critical understanding of professionalism attributes	2.1 Explore professional codes of practice and explain their relevance. 2.2 Discuss local and international legal imperatives relevant to computing professionals. 2.3 Understand the importance of professionalism and demonstrate appropriate behaviours at interview.
3. Discuss ethical and social issues and impacts related to Computing	3.1 Analyse scenarios and identify ethical issues and formulate a reasoned response. 3.2 Explain a range of examples of the impact of IT on society.
4. Undertake research into suitable careers and employment opportunities	4.1 Explore career opportunities available that match aspirations. 4.2 Identify relevant volunteering opportunities to help develop appropriate skills.
5. Develop a plan for CPD	5.1 Synthesise a plan to develop skills and knowledge to achieve career aspirations. 5.2 Produce a CV . 5.3 Complete job applications and/or a covering letter. 5.4 Perform appropriate presentations and interviews.
6. Participate constructively in teamwork	6.1 Work supportively as a member of a team. 6.2 Demonstrate leadership in a team situation.

Syllabus			
Topic No	Title	Proportion	Content
1	Employability Introduction	1/12 2 hours of lectures 4.5 hours of tutorials	• Definition of employability? Skills, Attitudes, Abilities • Soft skills required by employers • Hard skills required by employers • What do employers say they want? • E.g. Google, BAE, Apple and Hewlett Packard • Other research findings and surveys on modern business requirements and the changing role of the IT professional: • How candidates/prospective employees can demonstrate employability? • Lifelong learning/Work-life balance Learning Outcome: 1
2	Self-evaluation of skills/behaviours and areas for development	1/12 2 hours of lectures 4.5 hours of tutorials	• Auditing your skills • Identifying opportunities for learning and development • Creating a CPD plan for career development • Creating your CV Learning Outcome: 1, 5
3	Career Opportunities	1/12 2 hours of lectures 4.5 hours of tutorials	• Careers advice • Finding and researching suitable vacancies • Exploring careers and job opportunities available Learning Outcome: 4
4	Teamwork	1/12 2 hours of lectures 4.5 hours of tutorials	• Principles of good teamwork • Leading teams • Team exercises • Team presentation Learning Outcome: 6
5	Interviews	1/12 2 hours of lectures 4.5 hours of tutorials	• Gaining an interview • Interview advice: what to do and what to avoid • Practice interviews • Other recruitment tools available • Feedback Learning Outcome: 5

6	Ethics	1/12 2 hours of lectures 4.5 hours of tutorials	• Definition of ethics • Ethical dilemmas in Computing • Case studies: e.g., Bitcoin and Crypto currency, AI and Facial recognition, Bias Learning Outcome: 3
7	Professionalism	1/12 2 hours of lectures 2 hours of tutorials	• Definition of professionalism • Codes of conduct, e.g., BCS, ACM, ISACA • Professional bodies Learning Outcome: 2
8	Legal Imperatives	1/12 2 hours of lectures 4.5 hours of tutorials	• Typical laws related to computing ◦ International (eg GDPR) ◦ Local state laws and penalties Learning Outcome: 2
9	Social Impact of Computing	1/12 2 hours of lectures 4.5 hours of tutorials	• Exploring the impact of IT on society • Case studies :E.g. Social media, Internet, World Wide Web, Ecommerce, Robotics, AI, smartphones. Learning Outcome: 3
10	Practical Workshop 1	1/12 7 hours workshop tutorials	• Developing of skills through practical activities • Practice interviews • Produce a current CV • Conduct a presentation • Visiting inspirational speaker Learning Outcome: 5
11	Practical Workshop 2	1/12 7 hours workshop tutorials	• Developing of skills through practical activities • Practice interviews • Produce a current CV • Conduct a presentation • Visiting inspirational speaker Learning Outcome: 5

12	Practical workshop 3	1/12 7 hours workshop tutorials	• Developing of skills through practical activities • Practice interviews • Produce a current CV • Conduct a presentation • Visiting inspirational speaker <i>Learning Outcome: 5</i>
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Related National Occupational Standards (NOS)

Sector Subject Area: ICT Practitioners

Related NOS: N/A

Assessments

100% Assignment (CV, CPD Plan & career aspirations, mock interview)

8. IT Project Management

Title	IT Project Management
Unit reference number	L/651/0325
Credits	20
Level	5
Type	Core

Guided Learning Hours	60 hours	Total Qualification Time	200 hours
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Learning Outcomes; The Learner will:	Assessment Criteria; The Learner can:
1. Demonstrate a critical understanding of the nature of IT Projects, their activities and challenges	1.1 Define the term project and explain the activities involved in an IT project. 1.2 Explain typical activities in the system development life cycle (SDLC). 1.3 Discuss the challenges involved in an IT project. 1.4 Describe different approaches to project lifecycles.
2. Explain and use project planning principles and techniques to address broadly defined, complex problems	2.1 Explain the need for and purpose of project planning. 2.2 Produce a suitable project plan for a broadly defined complex problem. 2.3 Compare and contrast product based and activity-based planning methods and discuss their relationship. 2.4 Explain and use work and product breakdown structures (WBS and PBS). 2.5 Explain and use activity networks (activity on node diagrams). 2.6 Explain and use Gantt charts. 2.7 Discuss the principles, methods, advantages and disadvantages and relative accuracy of different estimating techniques.
3. Explain and apply procedures needed to monitor, control and report upon an IT project	3.1 Explain the purpose of monitoring and control and the project control cycle. 3.2 Explain activities and information involved in monitoring and controlling a project. 3.3 Identify and justify appropriate methods for monitoring and controlling a complex project scenario. 3.4 Discuss methods of change control and configuration management in the context of a project scenario. 3.5 Discuss the impact on the project of deviations and changes to project plan

4. Demonstrate a critical understanding of quality, its attributes and how it can be assessed and assured	4.1 Define product quality and software quality. 4.2 Distinguish quality control and quality assurance. 4.3 Discuss how quality can be measured. 4.4 Discuss the role, concepts and processes of ISO9000/ISO9126.
5. Discuss and apply the principles of project risk management	5.1 Define the concept of risk. 5.2 Explain the typical risks associated with IT projects. 5.3 Discuss the relative merits of quantitative and qualitative approaches to risk assessment. 5.4 Discuss different ways of controlling risk and their relative merits in a specific scenario. 5.5 Identify, represent and prioritise risks using a risk probability matrix for a specific scenario. 5.6 Construct a risk register for a specific project scenario.
6. Demonstrate a critical understanding of project organisation and teamwork	6.1 Explain the typical organisation for a large complex project. 6.2 Discuss the role of team building theory in the composition of project teams. 6.3 Explain the typical roles and responsibilities of stakeholders in a large complex project.

Syllabus content			
Topic No	Title	Proportion	Course coverage
1.	Introduction to ITPM	1/12 2 hours of lectures 3 hours of tutorials	- What is a project? - Project management Iron Triangle. - The nature of IT Projects and their challenges. - Typical activities in the system development life cycle. - The need for project management - Process models: Waterfall, Incremental, Iterative, Agile. - Prince 2 Learning Outcome: 1

2.	Stages in a Project	1/12 2 hours of lectures 3 hours of tutorials	• Project Initiation. • Feasibility studies and the establishment of a business case for a project. • Project set up. • Requirements elicitation, analysis and verification: purpose and methods. • Establishing project objectives, goals and measures of success. • Project management using a lightweight or agile approach with particular reference to incremental (i.e. delivering functionality to the users in small steps) and iterative (i.e. presenting a series of versions of the same software component for user evaluation) approaches. • Installation issues, including methods of going live. • Project closure and post implementation activities. • Project support activities, including configuration management and change control. Learning Outcome: 1
3.	Project Planning I	1/12 2 hours of lectures 3 hours of tutorials	• Approaches to planning: Product-based and activity-based planning. • Work and product breakdown structures (WBS and PBS). • Activity networks (activity on node diagrams). • Critical path analysis. Learning Outcome: 2
4.	Project Planning II	1/12 2 hours of lectures 3 hours of tutorials	• Project Schedule. • Gantt chart. • Resource allocation, resource types and resource clashes, identifying dependencies, creating critical path. • Agile approaches to planning: time-boxing; product and sprint backlogs; prioritisation using MoSCoW rules. Learning Outcome: 2

5.	Estimation	1/12 2 hours of lectures 3 hours of tutorials	• What to estimate and why? • Effort, Duration, Cost • Estimates and targets • Impact of over and under estimating • Elements of successful estimation • Principles, methods, advantages and disadvantages and relative accuracy of different estimating approaches: • parametric/algorithmic models • expert judgment, Delphi approach, Kickoff meeting, estimation sessions • analogy, • top-down • bottom-up Learning Outcomes: 2
6.	Monitoring and Control	1/12 2 hours of lectures 3 hours of tutorials	• Purpose of monitoring and control: key project metrics related to time/progress, costs, scope/size of functionality and quality; • The project control cycle: where and when to monitor; • Project control through monitoring; use of plans in project control • Report cycle: whom to report to and how to report; the reporting hierarchy. • Types of report: exception, progress (or checkpoint), management (e.g. highlight reports) • Monitoring and control of project finances and quality • Earned value analysis: planned and earned value, actual costs; cost and schedule performance indicators, including their graphical representation. • Corrective action and implications on the project of deviations and changes to project plan Learning Outcome: 3

7.	Change Control and Configuration Management	1/12 2 hours of lectures 3 hours of tutorials	• Reasons for change control and configuration management • Change control procedures: • Change control board • Generation , evaluation and authorisation of change requests • Configuration management • Purpose of procedures • Identification of configuration items • Product baselines • Configuration management databases • Version control (Git hub) Learning Outcomes: 3
8.	Quality	1/12 2 hours of lectures 3 hours of tutorials	• Definition of product quality and software quality • Quality assurance and quality control, • Measurement of quality • Defects: detection and removal. Testing and reviews • Project audit and quality audit • Types of testing • Management and control of testing • ISO 9000 series and ISO 9126 principles, methods and role • Process and product quality approaches: capability maturity models Learning Outcome: 4

9.	Risk	1/12 2 hours of lectures 3 hours of tutorials	• The concept of risk • Project Success measures • Risk identification: types of risk, risk checklists • Typical risks associated with IT projects and information systems • Qualitative and quantitative methods of assessing risk exposure and relative advantages • Risk prioritization: assessment of likelihood/ probability and impact of risk; • Probability impact grid • Risk treatment (avoidance, acceptance, transfer, mitigation) • Controlling risk: risk management tactics, including risk avoidance, risk transfer, risk reduction, risk mitigation and contingency planning • Risk registers • Information security risk assessment, IS027001, NIST • <i>Learning Outcomes: 5</i>
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10.	Project Organisation	1/12 2 hours of lectures 3 hours of tutorials	• Programmes and Projects • Identifying stakeholders and their concerns • Establishing the project authority / board • Membership of project board/ steering committee • Roles and responsibilities of project manager, team managers and team leaders • Desirable characteristics of project manager • Role of project support office • Project team and matrix management • Reporting structures and responsibilities • Management styles and communication • Team building theory and practice, structures and • responsibilities, including Belbin's team roles and Tuckman- Jensen stages of team evolution (forming, storming, norming, performing) • How to staff a project stage with appropriate skill sets; how and where to obtain skilled personnel • Appropriate management styles for development projects • Team management, motivation, retention Learning Outcomes: 6
11.	Case study	1/12 2 hours of lectures 3 hours of tutorials	Learning Outcomes: All
12.	Summary	1/12 2 hours of lectures 3 hours of tutorials	Learning Outcomes: All

Related National Occupational Standards (NOS)
Sector Subject Area: ICT Practitioners Related NOS: TECHDUBI1, TECHDUBI3, TECHDUCW1, TECHDUDA3, TECHDUSS1

Assessments
100% Assignment

7 Results and Certificates

The grade descriptors Pass, Merit and Distinction are awarded by Unit to successful candidates. A Pass is awarded for an overall Unit mark of between 40 and 59. A Merit is awarded for an overall Unit mark of between 60 and 69 and a Distinction is awarded for an overall Unit mark of 70 and above. Candidates who obtain an overall Unit mark of below 40 are classed as *fail* in the Unit and may resit.

A final qualification mark will be awarded upon successful completion of all units. This is calculated by finding the average mark of all units that make up the qualification. Please note that in exceptional circumstances, NCC Education may be required to change the algorithm to calculate a final qualification mark for a learner in order to secure the maintenance of standards over time. Any necessary changes to this algorithm would be shared with Centres and learners promptly by NCC Education.

The final Unit grade awarded will depend on the extent to which a candidate has satisfied the Assessment Criteria. A qualification is awarded when the candidate has achieved at least a pass in all Units.

After each assessment cycle, results slips are issued (in electronic format) which detail the grades achieved, i.e. Fail, Pass, Merit or Distinction. Certificates which contain your qualification grade and pass mark are then dispatched to Centres.

8 Further Information

For more information about any of NCC Education's products please contact customer.support@nccedu.com or alternatively please visit www.nccedu.com to find out more about our suite of high-quality British qualifications.