Awarding Great British Qualifications

LEVEL 3 DIPLOMA IN COMPUTING

(L3DC)

NCC Education
Qualification Unit Specification
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LEVEL 3 DIPLOMA IN COMPUTER (L3DC)

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About NCC Education

NCC Education is a UK awarding body, active in the UK and internationally. Originally part of the UK 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 forty 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.

Why choose this qualification?

NCC Education's Level 3 Diploma in Computing is:

- **Regulated** by Ofqual and Qualification Wales (QiW) and listed on the Qualifications and Credit Framework – Qualification Number 600/6407/9. 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 3 Diploma in Computing (RQF) The qualification introduces the field of computing and equips students with the necessary study skills to succeed in higher education.

  Students are introduced to essential IT Concepts, practical computing skills and mathematical concepts and techniques to further their understanding of computing.

- **Objective**

  Students that complete the Level 3 Diploma in Computing (L3DC) can:

  Enrol onto the NCC Education Level 4 Diploma in Computing (L4DC), equivalent to Year 1 of a UK bachelor's degree. Or apply to Year 1 of a university degree programme.

  The Level 3 Diploma in Computing syllabus and assessment is suitable for students aged 16-19 as well as adult learners.

  The above purpose is stated in the Qualification Specification. The Qualification Specification is published on the NCC Education website at: www.nccedu.com

Structure of the L3DC Qualification

Qualification Title, Credits, Units
NCC Education's Level 3 Diploma in Computing (RQF), 60 credits, all at RQF Level 3 **Total Qualification Time: 600 hours** **Guided Learning Hours (GLHs) for core units: 255** **Candidates must pass all 5 Units to be awarded the L3 Diploma in Computing.** **Units**

Study and Presentation Skills (10 credits)	Digital World (10 credits)	Introduction to Computer Science (10 credits)
Mathematical Skills for Computing (10 credits)	Introduction to Programming with Python (20 credits)	

Please see Syllabus Section, which include the Guided Learning Hours and Total Qualification Time for each Unit of the Level 3 Diploma in Computing.

Assessment for the Qualification

1. Assessment Objectives

All assessment for the qualification is intended to allow candidates to demonstrate 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.

2. Overview of Qualification Unit Assessment

Unit	Assessment Method	
	Exam	Global Assignment
Study and Presentation Skills	-	100%
Digital World	30% Local Exam (MCQ)	70%
Introduction to Computer Science	100% Global Exam (includes 70% Structured Questions and 30% MCQ)	-
Introduction to Programming with Python	30% Local Exam (MCQ)	70%
Mathematical Skills for Computing	100% Global Exam (includes 70% Structured Questions and 30% MCQ)	-

An examination is a time-constrained assessment that will take place on a specified date and usually in an NCC Education Centre. An assignment requires candidates to produce a written response to a set of one or more tasks, meeting a deadline imposed by the Centre.

The overall Unit mark is computed from the weighted mean of its components. The pass mark for a Unit is 40%. For units with more than 1 component, a total mark of 40 and above consider a pass. There is no requirement for each component to get a minimum 40% for a pass grade.

NCC Education Centres can provide candidates with a specimen assessment paper as well as a limited number of past examination and assignment papers.

Past examination and assignment papers may be made available only following results release for the corresponding assessment cycle. Results release dates and past examination and assignment release dates can be found in the Activity Schedules situated in the documents and forms area of *Quartz*, NCC Education's student registration system.

3. Accessibility of Assessment

We review our guidelines on assessment practices to ensure compliance with equality law and to confirm assessment for our Units is fit for purpose.

4. Reasonable adjustments and special consideration

NCC Education is committed to providing reasonable adjustments and special consideration so as to ensure disabled candidates, or those facing exceptional circumstances, are not disadvantaged in demonstrating their knowledge, skills and understanding.

Further information on NCC Education's arrangements for giving reasonable adjustments and special consideration can be found in the NCC Education *Reasonable Adjustments and Special Considerations Policy*.

5. Supervision and Authentication of Assessment

NCC Education Centres are required to organise all assessment activity for this specification according to NCC Education's Policies and Advice.

Candidates' identity and the authenticity of their work is verified and NCC Education moderates all assessment to ensure that the marking carried out is fair, and that the grading reflects the standard achieved by candidates as relevant to the specification Learning Outcomes and Assessment Criteria. Detailed guidance on this process and how candidate work must be submitted to NCC Education is given in NCC Education's *Examination Guidelines* and *Moderation Manual*. The Moderation Manual also includes full reminder checklists for Centre administrators.

Administration

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.

2. Language of Assessment

All assessment is conducted in English.

3. Candidates

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

4. Qualification Entry Requirements

Candidates who completed their GCSE/IGCSE 'O' Levels or an equivalent* qualification in their own country and passed 4 subjects with minimum grades of 'C', '4' or equivalent* in each. English and Mathematics should be included in these minimum grades.

In instances where a student achieves a lower score in Mathematics, they will be required to pass a Mathematics placement test set by the centre and achieve the minimum mark. **

Students who do not have a GCSE/IGCSE 'O' Levels or equivalent at a 'C' '4' in English, must have a valid score of 5.5 or above in the International English Language Testing System (IELTS) examination. Alternatively, students must take and pass the free NCC Education Higher English Placement Test which is administered by our Accredited Partner Centres.

The Level 3 Diploma in Computing syllabus and assessment is suitable for students aged 16-19 as well as adult learners.

*Centres need to provide evidence to justify any equivalency decision (both qualification equivalency and grade equivalency) they make pertaining to any enrolments via non-GCSE or non-standard routes.

**This is to be shared and agreed upon with NCC Education with evidence provided for each learner.

5. 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.

6. Resits

If a candidate fails an assessment, they will be provided with opportunities to resit during the eligibility period. Candidates may only seek reassessment in a previously failed Unit.

If a candidate has passed an assessment, they are eligible for 1 additional re-take only. The highest mark for the assessment will be awarded.

Syllabus

1. Study and Presentation Skills

Title	Study and Presentation Skills
Unit reference number	L/651/1072
Credits	10
Level	3

Guided Learning Hours	51 hours	**Total Qualification Time**	100 hours

Learning Outcomes The Learner will:	**Assessment Criteria** The Learner can:
1. Understand the nature and requirements of study at this level, and the skills needed to succeed	1.1 Recognise and demonstrate independent learning abilities appropriate to Higher Education. 1.2 Identify the main components of study skills. 1.3 Identify their own strength and development areas in study and presentation skills. 1.4 Use effective time management when studying. 1.5 Set SMART goals when studying.
2. Be able to gather key informtion effectively from a variety of appropriate sources	2.1 Identify information sources of appropriate quality for academic study. 2.2 Identify the key information from a range of different sources. 2.3 Record key points when listening to information being given. 2.4 Interpret and summarise unfamiliar content 2.5 Review and use their notes to summarise accurately information gained. 2.6 Use their notes to present a summary to others.
3. Be able to use critical reasoning both to analyse and to construct arguments	3.1 Understand the key concepts and principles of critical reasoning. 3.2 Use critical and analytical thinking when reading and writing. 3.3 Develop criteria for evaluating an argument or a line of reasoning in a piece of writing. 3.4 Develop criteria for evaluating the evidence in a piece of writing.

	3.5 Identify and draw valid conclusions. 3.6 Construct their own arguments with clarity, precision and persuasion.
4. Be able to produce a piece of academic work appropriate for this level	4.1 Describe the common steps in producing academic work. 4.2 Create a plan to meet the requirements of an academic assignment. 4.3 Develop sections of an assignment towards a final draft. 4.4 Check and evaluate own work against given criteria/requirements. 4.5 Explain the role of referencing and plagarism. 4.6 Demonstrate correct referencing in an academic essay/report. 4.7 Apply learnng from assessment feedback to academic work.
5. Understand the context, nature, and elements of research	5.1 Explain the role of theory, values, and ethical and political considerations in research. 5.2 Develop a strategy for a research project/report. 5.3 Describe and apply the essential elements of research: literature review, formulating concepts and theories, devising research questions, sampling, data collection, data analysis and writing up findings. 5.4 Explain different methods of data collection. 5.5 Select and apply appropriate data collection methods. 5.6 Discuss the difficulties and obstacles in research.
6. Be able to design to make an effective oral presentation	6.1 Present key concepts and ideas in a logical and persuasive way. 6.2 Design and use effective visual aids. 6.3 Select appropriate information for a specific audience and purpose. 6.4 Deliver presentation at appropriate pace and volume. 6.5 Establish eye contact and engage the audience. 6.6 Make use of effective emphasis and summary.

Syllabus			
Topic No	**Title**	**Proportion**	**Content**
1	Getting Ready for Study	1/12 2 hours of lectures 2 hours of tutorials	• Introduction to the unit • Study requirements in Higher Education • Independent study • Prioritising and time management • Goal setting - using SMART goals ***Learning Outcome: 1***
2	Learning and Skills Audit	1/12 2 hours of lectures 2 hours of tutorials	• Identifying current academic skills and development needs • Conditions for effective learning • Optimising your own learning ***Learning outcome: 1***
3	Gathering Information – Sources and Reading	1/12 2 hours of lectures 2 hours of tutorials	• Sources for information gathering – lectures, books, journals • Using the library and on-line sources • Reading strategies • Reading books and articles and taking useful notes • Note-taking styles • Reviewing and using notes ***Learning Outcome: 1,2***
4	Gathering Information – Lectures and Tutorials	1/12 2 hours of lectures 2 hours of tutorials	• Making notes in lectures. • Recognising key points • Finding the meaning of unfamiliar content • Using notes to write summaries • Using tutorial and group discussions ***Learning Outcome: 1,2,3***

5	Using Critical Thinking and Reasoning	1/12 4 hours of lectures 2 hours of tutorials	• The importance of a critical thinking and reasoning approach • Key concepts in critical thinking • Critical questioning • Critical thinking when reading - identifying and evaluating arguments. • Critical thinking when writing - making good arguments • Critical and analytical Vs Descriptive writing. • Critical thinking and data ***Learning Outcome: 1,3***
6	Planning for an assignment	1/12 2 hours of lectures 2 hours of tutorials	• Types of academic work and their requirements • Common steps in producing academic work • Academic style • Essay planning • Organising notes • Describing data ***Learning Outcome: 2,3,4***
7	Academic Writing	1/12 2 hours of lectures 2 hours of tutorials	• A procedure for writing assignments • Organising and linking information • Structuring your writing • Drafting, editing, and checking work • Plagiarism and Referencing ***Learning Outcome: 3, 4***
8	Writing a Research Report	1/12 2 hours of lectures 2 hours of tutorials	• Approaching the task and making a strategy • Understanding requirements and using research criteria • Structuring the report • Integrating evidence into a report • Editing and proof reading • Public speaking practice and assessment ***Learning Outcome: 4, 5, 6***

9	Data Collection	1/12 3 hours of lectures 2 hours of tutorials	• What is data collection and why use data? • Common challenges in data collection • The importance of data accuracy and appropriate data collection • Data collection approaches, tools, and techniques • Presenting data and information ***Learning Outcome: 5***
10	Developing a Presentation	1/12 2 hours of lectures 2 hours of tutorials	• What makes a good presentation? • Planning - define goals and know your audience • Preparing the contents • Using visual aids • Delivering the presentation ***Learning Outcome: 6***
11	Examinations and Revision	1/12 2 hours of lectures 2 hours of tutorials	• Preparing for exams • Preparing for a revision action plan • Writing summaries and reviewing notes • Managing stress and anxiety • During the exam ***Learning Outcome: 1***
12	Module Summary and Assignment	1/12 2 hours of lectures 2 hours of tutorials	• Summary and assignment planning / guidance • Presentation practice and assessment • Using feedback ***Learning Outcome: All***

Related National Occupational Standards (NOS)
Sector Subject Area: ICT Practitioners **Related NOS:** ESKIICF2**,** ESKIINT3, CFABAA617, CFABAA623, CFASAD111

Assessments
100 % Global Assignment.

2. Digital World

Title	Digital World
Unit reference number	M/651/0326
Credits	10
Level	3

Guided Learning Hours	48 hours	**Total Qualification Time**	100 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Discuss the development of the Digital Computer and its characteristics	1.1 Describe the origins of digital computer. 1.2 Describe the trends in development of computer hardware and software. 1.3 Explain how the advancement of computer hardware and software have enabled new application areas. 1.4 Define and discuss digital convergence.
2. Explain the key characteristics of a range of major digital technology innovations	2.1 Describe the basic theory and principles of operation of a range of digital technology developments. 2.2 Analyse how a range of digital technological innovations has contributed to new opportunities.
3 Appraise the impact on society of a range of major digital technology innovations	3.1 Analyse the consequences of a range of digital technological innovations on different sections of society.
4 Explain security threats posed by major digital technology innovations and possible control measures	4.1 Explain security terminology: threat, vulnerability, risk, impact, likelihood, control with examples. 4.2 Explain how threats can arise for a range of digital technological innovations and any potential controls.
5. Understand cultural, ethical, environmental, and legal issues relating to computing	5.1 Explain current individual (moral), social (ethical), legal, environmental, and cultural opportunities and risks of computing. 5.2 Explain how cultural and ethical issues can be addressed. 5.3 Identify laws and guidelines that relate to computing. 5.4 Discuss the challenges facing legislators in the digital age.

Syllabus			
Topic No	**Title**	**Proportion**	**Content**
1	An Introduction to the Digital Computer	1/12 2 hours of lectures 2 hours of tutorials	• A Brief history of the development of the digital computer. Digital and Analogue technology • What is Computing and Theory of Computation? • Computational thinking: abstraction, modelling, decomposition, algorithms, separation of concerns • Computing and innovation: range of application areas & technologies, automation • Skills and knowledge needed – associated disciplines **Learning Outcome: 1**
2	Data Processing	1/12 2 hours of lectures 2 hours of tutorials	• Data and Information • Automation, development of large-scale data processing, relational databases • Software crisis and software engineering: methodologies for producing reliable secure efficient systems • Issues of data privacy, accuracy. • Case study **Learning Outcome: 1**

3	Data Communication, Networking and the Internet	1/12 2 hours of lectures 2 hours of tutorials	• Sharing data over distance: the Internet • Bandwidth: constraints and enablement • The World Wide Web: Technology and applications • Web services • Digital convergence: Telecoms and Computing • Cloud computing – remote service provision (storage, software and processing). Advantages and disadvantages of cloud computing. • IoT – Internet of Things platform and sensors. Scenarios. • The dark web • Case study **Learning Outcome: 2**
4	Big Data and Data Analytics	1/12 2 hours of lectures 2 hours of tutorials	• Definition of Big Data (3V model) • Fact based and graph schema models for representation • Issues involved in processing big data • Data analytics of Big Data • Case study of big data processing and uses **Learning Outcome: 2**
5	Social Media, Social Networking, Virtual Reality and Cyberspace	1/12 2 hours of lectures 2 hours of tutorials	• Development of social media – history • Types of social media • Trends • Impact of algorithms and AI and deliberate/ unforeseen consequences • Case studies **Learning Outcome: 3**

6	Artificial Intelligence	1/12 2 hours of lectures 2 hours of tutorials	• Definitions: AI – does AI really mean anything? • Origins and development of AI theory and practice. • Types of AI system • Knowledge representation • Reasoning with uncertainty • The impact of Artificial Intelligence on society • Case studies: Machine Learning, NLP, Expert systems, Intelligent Agents, Neural nets **Learning Outcome: 2**
7	E-commerce	1/12 2 hours of lectures 2 hours of tutorials	• Definition of Ecommerce • Types of Ecommerce B2C, B2B, C2B Mobile • Underpinning technology and standards • Trends • Regulation • Global trends and challenges • Disruption, Growth and impact **Learning Outcome: 2, 3**
8	Security	1/12 2 hours of lectures 2 hours of tutorials	• Definitions: Security (CIA model), Threat, vulnerability, Risk, Impact, Likelihood • Types, range and origins of threats and vulnerabilities • Risk calculation • Risk mitigation and control • Case studies • Personal security **Learning Outcome: 4**
9	Cyber Warfare	1/12 2 hours of lectures 2 hours of tutorials	• Defining cyber warfare, cyber terrorism • Types of cyber warfare: espionage, Sabotage, Propaganda, DDoS • Motivation • Case studies and trends **Learning Outcome: 4**

10	The Impact of Digital Technology on Society	1/12 2 hours of lectures 2 hours of tutorials	• Ways of evaluation, who judges? How is it evaluated? Economic, power, technical, ethical, • see United Nations https://www.un.org/en/un75/impact-digital-technologies • Benefits: E.g: communications, education, automation, reduced unnecessary travel, remote monitoring etc • Disbenefits: Eg: Digital divide, social engineering, monitoring behaviour, amassing and analysis of personal information, distribution, publication, communication and dissemination of personal information. deep fakes, identity theft **Learning Outcome: 5**
11	Cultural, Ethical, Environmental, and Legal Issues Relating to Computing	1/12 2 hours of lectures 2 hours of tutorials	• The legal framework for protecting rights • Cultural considerations of technology on everyday lives, norms and societal values • Moral dilemmas in the development and use of technology such as AI • Ethical concerns on ensuring technology respects human rights • The environmental impacts of digital technology **Learning Outcome: 5**
12	Summary and Assignment	1/12 2 hours of lectures 2 hours of tutorials	• Summary of key elements of the unit • Assignment guidance and preparation **Learning Outcome: All**

Related National Occupational Standards (NOS)
Sector Subject Area: ICT Practitioners **Related NOS:** N/A

Assessments
70% Global Assignment 30% Local Exam (MCQ)

3. Introduction to Computer Science

Title	Introduction to Computer Science
Unit reference number	F/504/0727
Credits	10
Level	3

Guided Learning Hours	49 hours	**Total Qualification Time**	100 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Understand fundamental concepts relating to computer systems	1.1 Describe the purpose of a computer system. 1.2 Identify types of computers for different functions. 1.3 Describe an 'embedded system' and be able to recognise and provide examples of where this type of computing is used. 1.4 Describe the purpose of the main hardware components found in a typical desktop PC including motherboard, buses, ports, CPU, optical drives, hard disk store, cooling fan, ram sticks, power supply and graphics card. 1.5 Define the term 'hardware' and peripheral' and identify methods of connecting peripherals to a computer system. 1.6 Describe a range of input and output peripheral devices and justify the use of a type of device for a particular purpose. 1.7 Describe the purpose of a CPU, its components and their functions. 1.8 Describe the stages and components involved in the Fetch Decode Execute Cycle. 1.9 Describe the role of primary memory (RAM, ROM, registers and cache memory). 1.10 Describe a range of factors that affect the CPU performance.
2. Understand the characteristics of secondary storage	2.1 Describe a range of secondary storage media and justify the use of a type of storage media for a particular purpose. 2.2 Identify and convert between units of secondary storage. 2.3 Describe how data is stored on magnetic storage devices (hard disk drives, magnetic tape), optical storage devices (CD, DVD, Blu Ray) and solid state storage (solid state drives, USB pens, SD cards). 2.4 Explain the criteria for consideration when selecting secondary storage including cost, capacity, speed of access, portability, durability and reliability.

	2.5 Describe cloud storage and explain the advantages and drawbacks of using this type of storage. 2.6 Calculate data capacity.
3. Understand application and system software	3.1 Define the term 'application software'. 3.2 Describe a range of application software and justify the use of a type of software for a particular purpose including spreadsheets, databases, word processors, web-browsers, desk-top publishers, graphic design software and e-mail software. 3.3 Identify features of application software that make them suitable for a specific purpose. 3.4 Describe software licenses and why they are needed. 3.5 Describe piracy and the law that protects software developers. 3.6 Describe the purpose and functions of an operating system. 3.7 Define the term 'user interface' and describe a range of types of interface including graphical user interface, mobile user interface and a command line interface. 3.8 Describe the features of types of interfaces. 3.9 Describe how the operating system manages memory, peripherals, users and files including the use of paging, device drivers, access levels and auditing. 3.10 Describe a range of utility software and their role in maintaining computer systems including defragmentation, backups, encryption and compression.
4. Understand how computers store data	4.1 Describe how data is represented by the binary number system. 4.2 Demonstrate the addition of binary numbers. 4.3 Demonstrate the use of two's compliment to represent negative binary numbers. 4.4 Describe how keyboard characters are stored using binary including character sets ASCII & Unicode. 4.5 Describe the hexadecimal number system and explain why colours are often represented by hexadecimal. 4.6 Demonstrate conversion between hexadecimal and decimal and binary number systems. 4.7 Describe how images are represented in a computer system including colour depth, resolution and image size. 4.8 Describe how sound is represented in a computer system including sample rate and bit depth. 4.9 Calculate the size of an image and sound file and identify file formats of images and sound files. 4.10 Describe how lossy and lossless compression can facilitate the storage and transmission of data.
5. Understand logic gates	5.1 Describe a computer in terms of logic gates and circuits.

	5.2 Demonstrate the effects of the AND, OR, NAND, NOR, XOR and NOT gates. 5.3 Calculate the outputs of a combination of logic gates. 5.4 Draw logic gates circuit diagrams to represent logic sequences. 5.5 Describe the use of truth tables and create tables to record logic inputs and outputs.
6. Understand the fundamental concepts of computer networks and threats to network security	6.1 Explain the advantages and disadvantages of computer networks vs standalone computer systems. 6.2 Describe types of computer network and explain the criteria for selecting a particular type of network including LANs, WANS, peer-to-peer networks and client-server networks. 6.3 Describe the hardware used in connecting devices to a network including hubs, switches, WAP's and routers. 6.4 Describe and contrast the transmission media used in a computer network including twisted copper wire and fibre optic cable. 6.5 Describe how wireless networks work. 6.6 Describe the range of factors that affect the performance of a wired and wireless network. 6.7 Describe and contrast star and mesh network topologies. 6.8 Describe a range of threats against a computer network. 6.9 Describe the Internet and World Wide Web. 6.10 Define the terms 'social engineering', 'phishing', 'pharming' and 'shoulder-surfing'. 6.11 Describe a range of network security methods to prevent threats including firewalls, encryption, anti-malware software, mac address filtering, user access levels and the use of penetration testing. 6.12 Describe methods of user authentication.
7. Understand Ethical, Environmental and Cultural issues in Computing	7.1 Explain a range of ethical concerns with a range of technological developments including social media, virtual and augmented reality, cloud technology and music streaming. 7.2 Define the term 'artificial intelligence' and explain why AI presents ethical concerns for a range of sectors. 7.3 Describe a range of cultural issues involving technological advances including remote working and the 'digital divide' 7.4 Describe a range of environmental issues.

Syllabus			
Topic No	**Title**	**Proportion**	**Content**
1.	Introduction to Computer Systems and Hardware	1/12 3 hours of lectures 2 hours of tutorials	• Definition of computer system • Functions of a computer system: Input, Process and Output • Types of computer systems • Embedded Systems • Definition of hardware • Hardware components: Motherboard, chips, central processing unit (CPU), clock, memory, chipset, expansion slots and cards, power supply, fan, buses, connectors • Input and Output Peripherals **Learning Outcome: 1**
2	The CPU and Primary Memory	1/12 2 hours of lectures 2 hours of tutorials	• The purpose of a computer processor • Components of a CPU • The functions of a CPU • How components of a CPU communicate with each other • The fetch-execute-decode cycle • Primary Memory: RAM and ROM • Primary Memory: Cache and Registers • The CPU performance **Learning Outcome: 1**
3	Secondary Storage	1/12 2 hours of lectures 2 hours of tutorials	• Units of Storage • Magnetic Storage • Optical Storage • Solid State Storage • Criteria for Selecting Storage Medium • Cloud Storage • Calculating Capacity of files **Learning Outcomes: 2**

4	Application Software	1/12 2 hours of lectures 2 hours of tutorials	• Categories of software • Types, features and uses of application software • Criteria to consider when selecting application software • Software distribution • Proprietary Software • Open-Source Software • Software licences • Software piracy and the Copyright Law **Learning Outcome: 3**
5	System Software	1/12 2 hours of lectures 2 hours of tutorials	• System software • Operating systems • User Interfaces • Features of interfaces • Memory Management • User Management • File Management • Device Management • Utility Software • Defragmentation • Encryption • Compression **Learning Outcome: 3**
6	Data Representation: Numbers & Text	1/12 2 hours of lectures 2 hours of tutorials	• Binary representation of data • Number systems • Conversion between binary and decimal • Addition of binary numbers • Two's complement • ASCII representation of data • Unicode representation of data **Learning Outcome: 4**

7	Data Representation- Images & Sound	1/12 2 hours of lectures 2 hours of tutorials	• Hexadecimal number system • Converting decimal, binary and hexadecimal numbers • Image representation • Sound representation • Lossy compression • Lossless compression • Compression of data • Compression of images • File formats and sizes **Learning Outcome: 4**
8	Logic Gates	1/12 2 hours of lectures 2 hours of tutorials	• Digital logic • Truth Tables • Logic gates - AND - OR - NOT - NAND - NOR - XOR **Learning Outcome: 5**
9	Computer Networks	1/12 2 hours of lectures 2 hours of tutorials	Networks vs standalone machines Types of network Criteria for selecting a network Network connecting hardware Network transmission media Wireless networks Network performance issues Network topologies – star & mesh **Learning Outcome: 6**
10	The Internet & Network Security	1/12 2 hours of lectures 2 hours of tutorials	• The Internet • Network Threats • Social Engineering • Security Methods **Learning Outcome: 6**

	11	Computer Ethics	1/12 2 hours of lectures 2 hours of tutorials	Ethics Social Media and Privacy Artificial Intelligence Automation Cultural Issues The Digital Divide Environmental Issues **Learning Outcome: 7**
	12	Summary and Exam Preparation	1/12 2 hours of lectures 2 hours of tutorials	• Summary of key points • Exam preparation **Learning Outcome: All**

Related National Occupational Standards (NOS)
Sector Subject Area: ICT Practitioners **Related NOS:** ESKITU080, ESKIDMS1, ESKIDB1 ESKIDB2 ESKIDB3 ESKIDMS2 ESKIDMS1, ESKITP4062

Assessments
100% Global Exam (includes 70% Structured Questions and 30% MCQ)

4. Introduction to Programming with Python

Title	Introduction to Programming with Python
Unit reference number	A/651/0294
Credits	20
Level	3
Type	Core

Guided Learning Hours	59 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Describe and apply a systematic approach to the design of programs	1.1 Describe the Software Development Life Cycle. 1.2 Describe and apply techniques for creating high quality software. 1.3 Write pseudocode to solve a well-defined problem. 1.4 Describe and create a test plan for a program.
2. Write small procedural programs to perform well-defined tasks, following well-defined requirements	2.1 Use an appropriate software development environment. 2.2 Implement a simple algorithm written in pseudocode. 2.3 Describe and apply the fundamental concepts of procedural programming including sequence, selection and iteration. 2.4 Write code which uses input and output, including simple files. 2.5 Store data in memory in standard built-in types.
3. Test and document program code following the principles of software engineering	3.1 Develop programs incrementally, using simple tests to check each increment. 3.2 Write documentation to explain the design and implementation of their own code, or example code which is supplied to them. 3.3 Describe and apply different testing techniques. 3.4 Identify and correct bugs which prevent the program from functioning as intended.
4. Describe and apply the benefits of modular software design.	4.1 Describe and use functions. 4.2 Describe and use libraries and python modules. 4.3 Describe the basic concepts of Object-Oriented programming.

	4.4 Write a simple Object-Oriented program using a class and objects.

Syllabus			
Topic No	**Title**	**Proportion**	**Content**
1	Introduction	1/12 2 hours of lectures 3 hours of laboratory sessions	• Digital Computers: giving instructions • Computer Languages: Low level, High level; types of languages; why Python? • Software Development Lifecycle • Developing quality software: Software Engineering Principles • Designing programs: Algorithms, Pseudocode, sequence, selection, iteration • Test Plans ***Learning Outcome: 1***
2	Getting started with Python	1/12 2 hours of lectures 3 hours of laboratory sessions	• Installing and using the IDE • Installing Python • Interacting with Python • Command line • GUI • Help ***Learning Outcome: 2***
3	Introduction to data types and sequential programming	1/12 2 hours of lectures 3 hours of laboratory sessions	• Introduction to variables • Assignment statements • Introduction to data types • Arithmetic operations • Dates and Times • Comments • Writing a program using sequential statements. ***Learning Outcome: 2***
4	Making decisions: selection statements	1/12 2 hours of lectures 3 hours of laboratory sessions	• Pseudocode • Making decisions with the if statement • Comparison operators • If-else • Nested decisions • Multiple decisions • Writing a program using selection ***Learning Outcome:2***

5	Performing repetitive tasks: Loops	1/12 2 hours of lectures 3 hours of laboratory sessions	• Pseudocode • Bounded and unbounded loops • For loop • While loop • Controlling execution with break, continue, pass, else. • Writing a program using repetition. ***Learning Outcome:2***
6	Dealing with Errors	1/12 2 hours of lectures 3 hours of laboratory sessions	• Sources of errors • Testing • Debugging • Error types • Input validation • Catching exceptions • Raising exceptions • Writing a program using exception processing ***Learning Outcome: 3***
7	Programming with Strings	1/12 2 hours of lectures 3 hours of laboratory sessions	• Characters and Strings • String processing • String concatenation • Selecting individual Characters • Formatting strings • Escape characters • Writing a program with strings ***Learning Outcome: 2***
8	Lists	1/12 2 hours of lectures 3 hours of laboratory sessions	• Defining Lists • Creating Lists • Accessing and modifying lists • Looping through lists • Searching and sorting • The counter object • Writing a program with lists ***Learning Outcome: 2***

9	Modularity	1/12 2 hours of lectures 3 hours of laboratory sessions	• Software engineering principles in practice: planning, design, modularity, reuse, cohesion, coupling, defensive programming, testing • Functions: Arguments, returning values, defaults, local variables • Python modules: import and use ***Learning Outcome: 4***
10	Object Oriented Programming	1/12 2 hours of lectures 3 hours of laboratory sessions	• Object oriented concepts: introduction to encapsulation, abstraction, inheritance, (and polymorphism.) • Classes, objects, methods, attributes • Writing and using a simple class ***Learning Outcome: 4***
11	Storing Data in files	1/12 2 hours of lectures 3 hours of laboratory sessions	• Permanent storage • Creating a file • Reading a file • Updating a file • Deleting a file ***Learning Outcome: 2***
12	Summary and Assignment preparation	1/12 2 hours of lectures 2 hours of tutorials	• Summary of key points • Assignment guidance and preparation ***Learning Outcome: All***

Related National Occupational Standards (NOS)
Sector Subject Area: ICT Practitioners **Related NOS:** TECHDUCO1, TECHDUCW1, TECHDUPS1, ESKITU012, TECIS1201402

Assessments
70% Global Assignment 30% Local Exam (MCQ)

5. Mathematical Skills for Computing

Title	Mathematical Skills for Computing
Unit reference number	M/651/1073
Credits	10
Level	3
Type	Core

Guided Learning Hours	48 hours	**Total Qualification Time**	100 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Be able to perform a range of algebraic calculations	1.1 Simplify a range of algebraic expressions involving powers. 1.2 Simplify algebraic expressions by multiplying and dividing expressions. 1.3 Factorise algebraic expressions using a range of techniques. 1.4 Simplify and solve algebraic fractions.
2. Be able to solve a range of basic equations	2.1 Transpose formulae. 2.2 Solve linear and quadratic equations. 2.3 Solve simultaneous equations.

3. Be able to represent and solve algebraic equations through graphical solutions	3.1 Present linear and quadratic equations in graphical form. 3.2 Provide graphical solutions to simultaneous equations.
4. Understand the fundamentals of Set Theory	4.1 Apply Basic Set Theory. 4.2 Perform the operations of union, intersection, complement, and difference on sets using correct notation. 4.3 Draw and interpret Venn diagrams of set relations and operations. 4.4 Use Venn diagrams to solve problems.
5. Understand the fundamentals of Matrices	5.1 Explain the concept of matrices and determinants and their relationship. 5.2 Perform addition, subtraction and multiplication on simple matrices 5.3 Perform matrix transformations. 5.4 Describe the uses of matrices.
6. Be able to present data and relationships in graphical form	6.1 Present data using tables, histograms, pie charts and bar charts. 6.2 Construct frequency distributions. 6.3 Present data as box-plots, ogives and scatter graphs. 6.4 Explain the positive and negative correlation.
7. Understanding and use simple descriptive statistics	7.1 Calculate the mean, mode and median of a data set. 7.2 Calculate the mean for frequency tables and grouped data. 7.3 Calculate the range, quartiles and quantiles. 7.4 Calculate the variance. 7.5 Calculate the standard deviation.
8. Understand the fundamentals of Probability	8.1 Calculate single event probability using both fractions and decimal representation. 8.2 Calculate the probability of compound events using addition and multiplication rules. 8.3 Use tree diagrams to represent the probability of multiple events.

Syllabus			
Topic No	**Title**	**Proportion**	**Content**
1	Introduction to Algebra	1/12 2 hours of lectures 2 hours of tutorials	• Simplification of a range of algebraic expressions including those involving powers • Simplifying a range of algebraic expressions by multiplying and dividing expressions • Factorising algebraic expressions by using a range of techniques • Simplify and solve a range of Algebraic Fractions ***Learning Outcome: 1***
2	Using Algebraic Equations	1/12 2 hours of lectures 2 hours of tutorials	• Transposing formulae • Solving simple linear equations • Solving simple quadratic equations • Solving simultaneous equations ***Learning Outcome: 2***
3	Solving algebraic equations using graphs	1/12 2 hours of lectures 2 hours of tutorials	• Presenting a range of linear equations in graphical form • Presenting a range of quadratic equations in graphical form • Solving simultaneous equations using graphical forms ***Learning Outcome: 3***
4	Set Theory	1/12 2 hours of lectures 2 hours of tutorials	• Set and different types of sets • Operations on sets • Set Notations • Venn Diagrams ***Learning Outcome: 4***
5	Matrices	1/12 2 hours of lectures 2 hours of tutorials	• Matric Operations • Types of Matrices • Introduction to Matrix Algebra: Addition, Subtraction, and Multiplication • Matrix Transformation ***Learning Outcome: 5***

6	Presentation of Data 1	1/12 2 hours of lectures 2 hours of tutorials	• Present data using tables, pie charts and bar charts • Construct Frequency distributions ***Learning Outcome: 6***
7	Presentation of Data 2	1/12 2 hours of lectures 2 hours of tutorials	• Present data as histograms, box plots, ogives and scatter graphs • Interpreting correlation ***Learning Outcome: 6***
8	Introduction to Statistics	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Calculation of the arithmetic mean for a range of data samples • Calculation of the arithmetic mean for a range of frequency distributions • Calculation of the arithmetic mean for grouped data • Calculation of the modal value of data sets • Calculation of the median value of data sets ***Learning Outcomes: 7***
9	Understanding Dispersion	1/12 2 hours of lectures 2 hours of tutorials	• Calculation of the range, quartiles and quantiles • Calculation the mean deviation • Calculation of the variance • Calculation of the standard deviation ***Learning Outcome: 7***
10	Introduction to Probability	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Probability concepts, theoretical probability and experimental outcomes • Sample spaces, events, and probabilities ***Learning Outcome: 8***

11	Compound probability events	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Compound events and the fundamental counting principle • Tree diagrams ***Learning Outcome: 8***
12	Summary and Exam Preparation	1/12 2 hours of lectures 2 hours of tutorials	• Summary of key points • Exam preparation **Learning Outcome: All**

Related National Occupational Standards (NOS)
Sector Subject Area: ICT Practitioners **Related NOS:** N/A

Assessment Type
100% Global Exam (includes 70% Structured Questions and 30% MCQ)

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 *failed* in the Unit and may resist (see *Section 5.6* above).

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. An example is given below:

Unit	Unit Points	Candidate Mark	Unit Points * Candidate Mark
Study & Presentation Skills	10	90	900
Digital World	10	80	800
Introduction to Computer Science	10	85	850
Introduction to Programming with Python	20	70	1400
Mathematical Skills for Computing	10	85	850
	60	**420**	**4800**
			4800/potential 5000 = 80

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.

Further Information

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