NCC education®

Awarding
Great British
Qualifications

LEVEL 5 DIPLOMA IN COMPUTING

(L5DC)

NCC Education
Qualification Unit Specification
2023

Modification History

Version	Revision Description
V2.1	Updated NOS January 2020
V3.0	New specialisms added
V3.1	Updated ADI & DW January 2021
V3.2	“Global Examination” occurrences changed to “Time-constrained Assessment’ – February 2021
V3.3	Updated – added AI unit and Suggested Learning Hours – September 2021
V3.4	Update of assessment methodology for ISYSA
V3.5	“Time-constrained Assessment” occurrences changed to “Global Examination” – July 2023

Published by: NCC Education Limited, The Towers, Towers Business Park, Wilmslow Road, Didsbury, Manchester M20 2EZ UK

Tel: +44 (0) 161 438 6200 Fax: +44 (0) 161 438 6240 Email: info@nccedu.com
http://www.nccedu.com

CONTENTS

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 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.

1.1 Why choose this qualification?

NCC Education's Level 5 Diploma in Computing is:

- **Regulated** by Ofqual and listed on the Qualifications and Credit Framework – Qualification Number 600/3055/0. 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

- **A pathway qualification** for candidates who wish to complete the NCC Education degree journey. The Level 5 Diploma in Computing is equivalent to the second year of an IT degree in the UK university system. On successful completion, candidates will be able to complete the final year of a degree at one of the many universities that recognise NCC Education qualifications, or pursue a career in the IT industry.

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.

2. Structure of the L5DC Qualification

Qualification Titles, Credits, Units and Level
NCC Education Level 5 Diploma in Computing (RQF), 120 credits, all at RQF Level 5. **Specialist pathways are included within brackets in the qualification title:** • **NCC Education Level 5 Diploma in Computing** • **NCC Education Level 5 Diploma in Computing (with Business Management)** • **NCC Education Level 5 Diploma in Computing (with Cyber Security)** **Total Qualification Time: 1,200 hours (all specialisms).** **Guided Learning Hours:** • **NCC Education Level 5 Diploma in Computing: 342 hours** • **NCC Education Level 5 Diploma in Computing (with Business Management): 302 hours** • **NCC Education Level 5 Diploma in Computing (with Cyber Security): 438** **Please see Section 5 below for Syllabuses, which include the Guided Learning Hours and Total Qualification Time for each Unit of the Level 5 Diploma in Computing.** **This qualification is regulated by Ofqual and listed on the Qualifications and Credit Framework – Qualification Number 600/3055/0. For further information see http://register.ofqual.gov.uk/Qualification/Details/600_3055_0**

- **NCC Education Level 5 Diploma in Computing**

Candidates must pass 6 Units to be awarded the Level 5 Diploma in Computing certificate.

Category	Title	Unit Credit	Level
Core	Information Systems Analysis	20	5
Specialist	Database Design and Development	20	5
Specialist	Network Security and Cryptography	20	5
Specialist	Computing Project	20	5
Elective	Analysis, Design and Implementation	20	5
Elective	Artificial Intelligence	20	5
Elective	Professional Issues in IT	20	5
Elective	Dynamic Websites	20	5
Elective	Agile Development	20	5

- **NCC Education Level 5 Diploma in Computing (with Business Management)**

Candidates must pass all 6 Units to be awarded the Level 5 Diploma in Computing (with Business Management) certificate.

Category	Title	Unit Credit	Level
Core	Information Systems Analysis	20	5
Specialist	Business IT Project	20	5
Specialist	Database Design and Development	20	5
Specialist	Dynamic Websites	20	5
Specialist	Information Systems and Organisations	20	5
Specialist	Principles of Business Operations	20	5

- **NCC Education Level 5 Diploma in Computing (with Cyber Security)**

Candidates must pass 6 Units to be awarded the Level 5 Diploma in Computing certificate.

Category	Title	Unit Credit	Level
Core	Information Systems Analysis	20	5
Specialist	Business IT Project	20	5
Specialist	Computer Forensics and Incident Investigation	20	5
Specialist	Ethical Hacking and Information Security Assessments	20	5
Specialist	Network Security Threats and Defence Mechanisms	20	5
Elective	Analysis, Design and Implementation*	20	5
Elective	Professional Issues in IT**	20	5

*This elective it is only recommended for students who have previously completed the Level 4 Diploma in Computing.

** This elective is recommended for students who have previously completed the Level 4 Diploma in Computing (with Business Management).

3. Assessment for the qualification

3.1 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.

3.2 Overview of Qualification Unit Assessment

Unit	Assessment Methods	
	Global Examination	Global Assignment
Agile Development	-	100%
Analysis, Design and Implementation	-	100%
Artificial Intelligence	-	100%
Business IT Project	-	100%
Computer Forensics and Incident Investigation	-	100%
Computing Project	-	100%
Database Design and Development	-	100%
Dynamic Websites	-	100%
Ethical Hacking and Information Security Assessments	-	100%
Network Security and Cryptography	50%	50%
Information Systems Analysis	-	100%
Information Systems and Organisations	-	100%
Principles of Business Operations	-	100%
Professional Issues in IT	-	100%
Network Security Threats and Defence Mechanisms	-	100%

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. Global Assignments are marked by the Centre and Global Examination are marked by NCC Education.

The overall Unit mark is computed from the weighted mean of its components. The pass mark for a Unit is 40%.

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 area of *Candidate Registration Portal*, NCC Education's student registration system.

3.3 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.

3.3.1 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*.

3.3.2 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 *Instructions for Conducting Examinations* and *Assessments Instructions.* The Assessments Instructions also includes full reminder checklists for Centre administrators.

4 Administration

4.1 Assessment Cycles

Four assessment cycles are offered throughout the year, in Spring, Summer, Autumn and Winter.

Examination dates and assignment submission deadlines are published in the NCC Education *Activity Schedule*, which is provided to Centres by Customer Support. It is also available on *Candidate Registration Portal,* 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.

4.2 Language of Assessment

All assessment is conducted in English.

4.3 Candidates

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

4.4 Qualification and Unit Entry Requirements

Entry Requirements
• Holders of the NCC Education Level 4 Diploma in Computing (L4DC) (RQF) for all pathways • Holders of the NCC Education Level 4 Diploma in Computing (with Business Management) (L4DC) (RQF) for candidates studying the Level 5 Diploma in Computing (with Business Management) and Level 5 Diploma in Computing (with Cyber Security) specialisms • Holders of any local or international qualification deemed to be a similar level to these awards. Candidates in this category whose first language is not English will also require IELTS 5.5 or equivalent. **Direct Entry at Other Points** The majority of students are expected to join the NCC Education IT 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.

4.5 Candidate Entry

Candidates are registered for assessment via NCC Education's *Candidate Registration Portal* system and according to the deadlines for registration provided in the *Activity Schedule*.

Candidates are registered for the assessment of each Unit they wish to take in a particular assessment cycle (e.g. Units A and B in Summer, Units C and D in Autumn, Units E and F in Winter and Units G and H in Spring). This includes candidates who need to resit a particular Unit.

Further details can be found in NCC Education's *Operations Manual*.

4.6 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.

4.7 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.

5. Syllabus

5.1. Agile Development

Title:	Agile Development

RQF code:	J/503/4783	**Credits**	20	**Level**	5

Guided Learning Hours	60 hours	**Total Qualification Time**	200 hours

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

Syllabus content	
Topic	***Course coverage***
1. An Overview of Agile	• 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	• What is DSDM Atern? • 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	• 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	• 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	• 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	• Key Differences in style between Traditional and Agile (Atern) 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	• Configuration Management • Quality and Maintainability • Testing concepts • Metrics ***Learning Outcomes: 1, 2 & 6***
8. Facilitated Workshops	• What is a Facilitated workshop? • The role of the Facilitator; co-facilitator/scribe; participants. • Workshop planning • Workshop success factors ***Learning Outcome: 6***
9. Requirements Definition and Prioritisation	• 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 Outcome: 6***

10. Iterative Development and Prototyping	• 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 Outcome: 6***
11. Estimating and Timeboxing	• 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 MoSCoWed requirements • Delivery (increment) planning • Timebox planning • Timeboxing as a key technique ***Learning Outcome: 6***
12. Unit Summary and Revision Guidance	• Revision ***Learning Outcomes: All***

Related National Occupational Standards (NOS)
Sector Subject Area: 6.1 ICT Professionals **Related NOS:** 4.4.P.3 – Monitor the effectiveness of systems analysis activities and their deliverables; 4.4.S.1 – Design, implement and maintain systems analysis activities; 4.4.S.2 – Manage the systems analysis assignment activities; 4.4.S.3 – Liaise with others on matters relating to systems analysis activities; 4.4.S.4 – Review and sign off systems analysis outcomes

Assessments
Global Assignment (100%)
See also Section 3 above

5.2. Analysis, Design and Implementation

Title:	Analysis, Design and Implementation

RQF code:	H/503/4869	**Credits**	20	**Level**	5

Guided Learning Hours	60 hours	**Total Qualification Time**	200 hours

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 content	
Topic	***Course coverage***
1. Introduction to the module	• Introduction to the module • Distinction between analysis and design • The Software Crisis • Recap of key OO concepts ***Learning Outcomes: 1***
2. Paper Prototyping	• Paper prototyping overview • How to do it • What you learn • Why it's useful ***Learning Outcomes: 1, 2 & 3***
3. User Centred Design	• Introduction to UCD • Mental Models • Personas ***Learning Outcomes: 5 & 6***
4. Agile Object Orientation	• 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	• Requirements gathering • Identifying abstractions • Candidate classes • Class diagrams • Converting class diagrams into code ***Learning Outcomes: 1 & 5***
6. Dynamic Analysis and Design	• Activity diagrams • Sequence diagrams • Converting dynamic models into code ***Learning Outcomes: 1 & 5***

7. Design Case Study	• Worked example from problem statement to • design ***Learning Outcomes: 1, 3 & 5***
8. Design Patterns (1)	• Introduction to design patterns • Factory • Abstract Factory ***Learning Outcomes: 2, 3 & 4***
9. Design Patterns (2)	• Introduction to design patterns • Factory • Abstract Factory ***Learning Outcomes: 2, 3 & 4***
10. Elements of Good Design	• Software quality attributes • Software component design • Coupling • Cohesion • The Observer design pattern ***Learning Outcomes: 3 & 5***
11. Redesign and Implementation	• Redesign of case study • Incorporation of design patterns • Implementation of elements of previous design • case study into code ***Learning Outcomes: 2 & 6***
12. Maintenance	• Impact of change • Refactoring • Refactoring case study ***Learning Outcomes: 4***

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:** ESKITP4034 P1-4 – Manage, under supervision, information to direct human needs analysis assignments; ESKITP4034 P5-9 – Produce, implement and maintain quality human needs analysis activities; ESKITP4034 P10-13 – Provide human needs analysis findings to others; ESKITP4074 P1-4 – Prepare, under supervision, for system/solution/service design activities; ESKITP4074 P5-8– Assist with the design of system/solution/service design;

ESKITP4074 P9-11– Monitor the progress of system/solution/service design activities; ESKITP5015v2 P4-7- Initiate systems development activities; ESKITP5015v2 P8-12- Manage systems development activities; ESKITP5022v2 - Perform software development activities; ESKITP5034 P5-8 - Contribute to the communication of the results of IT/Technology solution testing; ESKITP5035 P1-3- Implement the infrastructure for testing activities; ESKITP5035 P4-10- Manage testing activities; ESKITP5035 P11-17- Monitor and control testing activities.

Assessments
Global Assignment (100%)
See also Section 3 above

5.3. **Artificial Intelligence**

Title:	Artificial Intelligence

RQF code:		**Credits**	20	**Level**	5

Guided Learning Hours	60 hours	**Total Qualification Time**	200 hours

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 content	
Topic	**Course coverage**
1. Introduction to AI	• 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	• Problem representation in state space • Strategies for state space search • Uninformed search (blind search) • Informed search (heuristic Search) ***Learning Outcome: 2***
3. Knowledge Representation	• Types of knowledge • Logical representation • Semantic network representation • Frame representation • Production Rules ***Learning Outcome: 2***
4. Uncertain Knowledge	• Uncertainty and its sources • Basic probability • Bayes' rule • Bayesian reasoning • Certainty factors ***Learning Outcome: 3***
5. Fuzzy Logic	• Fuzzy logic • Linguistic variables • Fuzzy sets and operations • Fuzzy rules • Fuzzy system ***Learning Outcome: 3***
6. Machine Learning	• Introduction • Supervised learning • Unsupervised learning • Reinforcement learning • Applications of machine learning ***Learning Outcome: 4***

7. Neural Networks	• Basic structure • Perceptron • Multilayer neural networks • Backpropagation learning • Accelerated learning • Recurrent neural networks ***Learning Outcome: 4, 6***
8. Decision Trees	• Structure and terminologies • Attribute selection measures ***Learning Outcome: 4, 6***
9. Genetic Algorithms	• Simulation of Natural Evolution • Basic genetic algorithms ***Learning Outcome: 4***
10. Expert Systems	• 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	• 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	• 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: IT and Telecoms **Related NOS:**

Assessments
Global Assignment (100%)
See also Section 3 above

5.4. Business IT Project

Title:	Business IT Project

RQF code:	L/503/4770	**Credits**	20	**Level**	5

Guided Learning Hours	24 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Plan and manage the development of a computing artefact	1.1 Produce a viable project plan 1.2 Check progress against a plan 1.3 Evaluate performance against a plan
2. Gather and evaluate requirements for an IT project	2.1 Document requirements in an appropriate way 2.2 Evaluate requirements 2.3 Prioritise requirements
3. Conduct research to support the development of a computing artefact	3.1 Document research activities in an appropriate way 3.2 Evaluate research material 3.3 Synthesise a course of action from the evaluation of material
4. Employ software engineering techniques in the development of a computing artefact	4.1 Select and justify the use of software engineering methods, techniques and tools for the development of a computing artefact 4.2 Employ and appropriately document the use of software engineering methods, techniques and tools for the development of a computing artefact 4.3 Evaluate the use of software engineering methods, techniques and tools for the development of a computing artefact
5. Evaluate the success of a computing artefact	5.1 Evaluate a computing artefact against specification and requirements 5.2 Test that a computing artefact meets its requirements

Syllabus content	
Topic	**Course coverage**
1. Introduction	• Planning your Project • Documenting Requirements ***Learning Outcomes: 1 and 2***

2. Conducting Research	• Documenting Research Activities • Evaluating Research • Synthesising a Course of Action ***Learning Outcome: 3***
3. Employing Software Engineering	• Appropriate Development Methods • Structure of a Design Specification • Content of a Design Specification ***Learning Outcome: 4***
4. Evaluating Computing Artefacts	• Why do we evaluate a computing artefact? • How do we evaluate a computing artefact? ***Learning Outcome: 5***
5. Final Report	• Structure of Final Report • Content of Final Report • Citations and Referencing (Reminder) • Appropriate Appendices ***Learning Outcomes: 1, 2, 3, 4 & 5***
6. Project and Report Completion	• Private study time should include weekly meetings with your tutor to discuss your progress. • Project production ***Learning Outcomes: 1, 2, 3, 4 & 5***

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:** ESKITP4024 P10-14– Manage the outcomes from the data analysis assignment; ESKITP4025 P6-9– Manage effective data analysis activities; ESKITP4025 P10-12– Maintain effective data analysis deliverables; ESKITP4034 P1-4 – Manage, under supervision, information to direct human needs analysis assignments; ESKITP4034 P5-9 – Produce, implement and maintain, quality human needs analysis activities; ESKITP4034 P10-13 – Provide human needs analysis findings to others; ESKITP4054 P1-4 – Assist with the development for data design activities; ESKITP4054 P5-9 – Manage, under supervision, the maintenance of data design assignments; ESKITP4054 P10-13 – Provide others, when requested, with specified information relating to data design activities; ESKITP4055 P1-5 – Select and implement appropriate data design processes; ESKITP4064 P1-5– Prepare for human interaction and interface (HCI) design activities; ESKITP4064 P6-8– Implement, under supervision, human interaction and interface (HCI) design activities; ESKITP4064 P9-12– Manage the needs of different users of HCI design activities; ESKITP4074 P1-4– Prepare, under supervision, for system/solution/service design activities; ESKITP4074 P5-8– Assist with the design of system/solution/service design; ESKITP4074 P9-11– Monitor the progress of system/solution/service design activities; ESKITP5014v2 P6-10- Contribute to the management of systems development; ESKITP5015v2 P8-12- Manage systems development activities; ESKITP5016v2 P5-11- Control systems development activities; ESKITP5032 P1-5, ESKITP5024 P1-5- Plan software development activities; ESKITP5024 P6-12- Perform software development activities; ESKITP5024 P13-16- Control software development activities; ESKITP5024 P17-22 - Contribute to the management of software development; ESKITP5033 P1-5- Carry out IT/Technology solution testing activities under direction; ESKITP5034 P1-4- Carry out IT/Technology solution testing; ESKITP5034 P5-8- Contribute to the communication of the results of IT/Technology solution testing; ESKITP5044 P4-8, ESKITP5043 P1-5 - Perform systems integration activities; ESKITP5054 P1-4- Perform systems installation, implementation and handover activities; ESKITP5054 P5-8- Document and present systems installation, implementation and handover activities

Assessments
Global Assignment (100%)
See also Section 3 above

5.5. Computer Forensics and Incident Investigation

Title:	Computer Forensics and Incident Investigation

RQF code:	T/618/1451	**Credits**	20	**Level**	5

Guided Learning Hours	80	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Understand the fundamental concept of computer forensics, incident response, and different types of cybercrimes	1.1 Define computer forensics 1.2 Assess cybercrime investigation and the different types of cybercrimes 1.3 Discuss rules of forensic investigation 1.4 Describe the roles, the different types and the characteristics of digital evidence 1.5 Discuss federal rules of evidence and the sources of potential evidence 1.6 Discuss computer forensics as part of incident response plan
2. Recognise the roles and responsibilities of a forensic investigator	2.1 Argue the need for a forensic investigator 2.2 Discuss the roles and responsibilities of a forensic investigator and what makes a good forensic investigator? 2.3 Explain legal issues, privacy issues, and the code of ethics for a forensic investigator
3. Know the various phases involved in the computer forensic investigation process and the importance of chain of custody	3.1 Explain the importance and various phases of the computer forensics investigation process 3.2 Identify the requirements for building a computer forensics lab and an investigation team 3.3 Assess the roles of a first responder and the importance of chain of custody 3.4 Discuss data duplication, deleted data recovery and evidence examination 3.5 Describe what an expert witness is and explain how to close a case
4. Analyse the physical and logical structure of a hard disk	4.1 Assess different types of disk drives 4.2 Describe the physical and logical structure of a hard disk 4.3 Explain the different types of hard disk interfaces and components 4.4 Describe hard disk partitions 4.5 Explain the Windows, Mac, and Linux boot processes
5. Comprehend various types of file systems such as Windows, Linux, Mac OS and	5.1 Discuss various types of file systems 5.2 Understand RAID storage systems and explain the different levels of the storage system 5.3 Discuss file system analysis and file carving

analyse various RAID storage systems.	
6. Understand the importance of data acquisition and determine the best acquisition method and tools	6.1 Discuss the importance of data acquisition 6.2 Discuss live and static data acquisition 6.3 Explain and review data acquisition and duplication steps 6.4 Determine the best acquisition methods and how to select appropriate data acquisition tools 6.5 Explain how to perform data acquisition on Windows and Linux machines
7. Identify the goals, challenges and techniques of anti-forensics	7.1 Explain Anti-forensics 7.2 Assess the goals and review anti-forensics techniques 7.3 Interpret the steps for detecting Rootkits 7.4 Explains various type of anti-forensics tools
8. Understand how to collect and examine volatile and non-volatile data in Windows and Linux machines	8.1 Explain how to collect and examine volatile and non-volatile data in Windows and Linux machines 8.2 Examine the cache, cookie, and history recorded in web browsers 8.3 Examine Windows files and metadata 8.4 Analyse text based logs and Windows event logs 8.5 Explain various Linux based shell commands and log files 8.6 Explain the need for Mac forensics and examine Mac forensics data and log files

Syllabus content	
Topic	**Course coverage**
1. Computer Forensics in Today's World – Part One	• Understanding Computer Forensics • Types of Cybercrimes • Challenges Cyber Crimes Present to Investigators • Cyber Crime Investigation • Rules of Forensics Investigation • Understanding Digital Evidence • Sources of Potential Evidence **Learning Outcomes: 1, 2**
2. Computer Forensics in Today's World - Part Two	• Rules of Evidence • Forensics Readiness • Computer Forensics as Part of Incident Response Plan • Need for Forensic Investigator • Roles and Responsibilities of Forensics Investigator • What makes a Good Computer Forensics Investigator? • Legal and Privacy Issues • Code of Ethics • Accessing Computer Forensics Resources **Learning Outcomes: 1, 2**
3. Computer Forensics Investigation Process - Part One	• Importance of Computer Forensics Process • Phases Involved in the Computer Forensics Investigation Process • Pre-investigation Phase • Investigation Phase • Computer Forensics Investigation Methodology **Learning Outcomes: 3**
4. Computer Forensics Investigation Process - Part Two	• Computer Forensics Investigation Methodology: Documentation and Reporting • Computer Forensics Investigation Methodology: Testify as an Expert Witness **Learning Outcomes: 3**
5. Understanding Hard Disks and File Systems - Part One	• Disk Drive Overview • Disk Partitions • Understanding File Systems • RAID Storage System **Learning Outcomes: 4, 5**
6. Understanding Hard Disks and File Systems - Part Two	• File System Analysis **Learning Outcomes: 4, 5**
7. Data Acquisition and Duplication - Part One	• Understanding Data Acquisition • Live Data Acquisition • Static Data Acquisition **Learning Outcomes: 6**

8. Data Acquisition and Duplication - Part Two	• Determine the Data Acquisition Format • Validate Data Acquisitions • Acquisition Best Practices **Learning Outcomes: 6**
9. Defeating Anti-forensics Techniques - Part One	• What is Anti-Forensics? • Anti-Forensics Techniques **Learning Outcomes: 7**
10. Defeating Anti-forensics Techniques - Part Two	• Anti-Forensics Techniques • Anti-Forensics Tools **Learning Outcomes: 7**
11. Operating System Forensics - Part One	• Introduction to OS Forensics • Windows Forensics • Collecting Volatile Information • Collecting Non-Volatile Information • Analyse the Windows Thumb caches • Windows Memory Analysis • Windows Registry Analysis • Cache, Cookie, and History Analysis • Windows File Analysis • Metadata Investigation ***Learning Outcomes: 8***
12. Operating System Forensics - Part Two	• Text Based Logs • Other Audit Events • Forensic Analysis of Event Logs • Linux forensics • Shell Commands • Linux Log files • Collecting Volatile Data • Collecting Non-Volatile Data • Mac Forensics • Introduction to MAC Forensics • MAC Forensics Data • MAC Log Files • MAC Forensics Tools ***Learning Outcomes: 8***

Assessments
Global Assignment (100%)
See also Section 3 above

5.6. Computing Project

Title:	Computing Project

RQF code:	L/503/4784	Credits	20	Level	5

Guided Learning Hours	24 hours	Total Qualification Time	200 hours

Learning Outcomes; The Learner will:	Assessment Criteria; The Learner can:
1. Identify a suitable computing artefact and development method	1.1 Select and justify an appropriate computing artefact to develop
2. Project manage the analysis, design, development and deployment of a computing artefact	2.1 Select and justify the use of an appropriate development method 2.2 Produce a viable project plan 2.3 Check progress against a project plan 2.4 Evaluate his/her performance against a project plan 2.5 Select and justify the use of an appropriate risk management approach 2.6 Select and justify the use of an appropriate configuration management approach
3. Carry out the analysis for a computing artefact	3.1 Elicit requirements 3.2 Prioritise requirements 3.3 Produce a requirements specification 3.4 Produce an analysis specification
4. Design a computing artefact	4.1 Enhance requirements 4.2 Produce a design specification
5. Develop a computing artefact	5.1 Select and justify the use of an appropriate development environment 5.2 Write the code for a computing artefact
6. Test a computing artefact	6.1 Develop appropriate test scripts 6.2 Test that a computing artefact meets its requirements by using test scripts

Syllabus content	
Topic	***Course coverage***
1. Introduction	• Appropriate Artefacts • Planning your Project • Appropriate Development Methods • Appropriate Risk Management • Appropriate Configuration Management ***Learning Outcome: 2***
2. Analysis Specifications	• Structure of an Analysis Specification • Content of an Analysis Specification ***Learning Outcome: 3***
3. Design Specifications	• Structure of a Design Specification • Content of a Design Specification ***Learning Outcomes: 4 & 5***
4. Test Scripts	• Types of Testing (Reminder) • Choosing Appropriate Tests • Applying Tests • Documenting Tests ***Learning Outcome: 6***
5. Planning the final report	• Structure of Final Report • Content of Final Report • Citations and Referencing (Reminder) • Appropriate Appendices ***Learning Outcomes: 1, 2 & 3***
6. Project and Report Completion	• Private study time should include weekly meetings with your tutor to discuss your progress. • Project production ***Learning Outcomes: 1 - 6***

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:** ESKITP4024 P10-14– Manage the outcomes from the data analysis assignment; ESKITP4025 P1-5– Prepare for data analysis activities; ESKITP4025 P6-9– Manage effective data analysis activities; ESKITP4025 P10-12– Maintain effective data analysis deliverables; ESKITP4034 P1-4 – Manage, under supervision, information to direct human needs analysis assignments; ESKITP4034 P5-9 – Produce, implement and maintain, quality human needs analysis activities; ESKITP4034 P10-13 – Provide human needs analysis findings to others; ESKITP4054 P1-4 – Assist with the development for data design activities; ESKITP4054 P5-9 – Manage, under supervision, the maintenance of data design assignments; ESKITP4054 P10-13 – Provide others, when requested, with specified information relating to data design activities; ESKITP4055 P1-5 – Select and implement appropriate data design processes; ESKITP4064 P1-5– Prepare for human interaction and interface (HCI) design activities; ESKITP4064 P6-8– Implement, under supervision, human interaction and interface (HCI) design activities; ESKITP4064 P9-12– Manage the needs of different users of HCI design activities; ESKITP4074 P1-4– Prepare, under supervision, for system/solution/service design activities; ESKITP4074 P5-8– Assist with the design of system/solution/service design; ESKITP4074 P9-11– Monitor the progress of system/solution/service design activities; ESKITP5014v2 P1-5- Perform systems development activities; ESKITP5014v2 P6-10- Contribute to the management of systems development; ESKITP5015v2 P8-12- Manage systems development activities; ESKITP5016v2 P5-11- Control systems development activities; ESKITP5032 P1-5, ESKITP5024 P1-5- Plan software development activities; ESKITP5024 P6-12- Perform software development activities; ESKITP5024 P13-16- Control software development activities; ESKITP5024 P17-22 - Contribute to the management of software development; ESKITP5033 P1-5- Carry out IT/Technology solution testing activities under direction; ESKITP5034 P5-8- Contribute to the communication of the results of IT/Technology solution testing; ESKITP5044 P4-8, ESKITP5043 P1-5 - Perform systems integration activities; ESKITP5054 P1-4- Perform systems installation, implementation and handover activities;

Assessments
Global Assignment (100%)
See also Section 3 above

5.7. Database Design and Development

Title:	Database Design and Development

RQF code:	D/503/4787	**Credits**	20	**Level**	5

Guided Learning Hours	60 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Understand the enterprise application of database systems	1.1 Summarise the common use of distributed database management systems 1.2 Explain the meaning of the term disributed database management system 1.3 Describe the components of a disributed database management system 1.4 Summarise the common use of data warehouses 1.5 Explain the meaning of the term data warehouse 1.6 Describe the structure of a data warehouse
2. Understand how to enhance the design of and further develop a database system	2.1 Describe how tables that contain redundant data can suffer from update anomalies 2.2 Explain how to overcome update anomalies using normalisation 2.3 Describe how to retrieve data from one or more tables using SQL
3. Be able to enhance a logical database design	3.1 Check the tables are well-structured using normalisation 3.2 Define the integrity constraints on the tables
4. Be able to develop a physical database design	4.1 Map a logical database design to a physical database design 4.2 Design tables for a target DBMS 4.3 Design a representation of derived data 4.4 Design integrity constraints for the target DBMS 4.5 Denormalise tables where appropriate
5. Be able to enhance a database system using SQL	5.1 Apply integrity constraints 5.2 Retrieve data from one or more tables using join 5.3 Retrieve data from one or more tables using sub-queries

Syllabus content	
Topic	***Course coverage***
1. Key Concepts in Databases and Database Management	• Review of key material from Level 4 databases Unit • Common uses of databases • Types of databases • Overview of database development ***Learning Outcomes: All***
2. Enhancing Design 1	• Introduction to normalisation • The concept of functional dependency • Data redundancy and update anomalies • Overcoming anomalies with normalisation ***Learning Outcome: 2***
3. Enhancing Design 2	• Deriving a set of relations from a conceptual data model • Validating relations using normalisation • Integrity constraints on tables ***Learning Outcome: 3***
4. Data Retrieval 1	• Table and view structure in a relational database • Data types • Null values • Retrieving data using SQL ***Learning Outcome: 2***
5. Data Retrieval 2	• Referential integrity in relational databases • Types of joins • Retrieving data using joins • Retrieving data using sub-queries ***Learning Outcome: 5***
6. Physical Design 1	• The purpose of physical design • Mapping the logical database design to a physical database design • Designing tables for the target DBMS ***Learning Outcome: 4***
7. Physical Design 2	• The concept of derived data • Designing a representation of derived data ***Learning Outcome: 4***
8. Physical Design 3	• Types of constraints • Designing integrity constraints for the target DBMS ***Learning Outcomes: 3, 4 & 5***

9. Physical Design 4	• Understanding transactions • Denormalisation • Improving performance • Estimating the size of the database ***Learning Outcome: 4***
10. Distributed Databases	• The need for distributed databases • Components of distributed databases • Advantages and disadvantages of distributed databases • Homogenous and Heterogeneous distribution • Distributed Database Design ***Learning Outcome: 1***
11. Data Warehouses	• The need for business intelligence and the concept of the data warehouse • The difference between Online Transaction Processing (OLTP) systems and data warehousing • The architecture and main components of a data warehouse ***Learning Outcome: 1***
12. Summary	• Summary of Unit, linking units to objectives and to each other • Clarification of material and related issues as identified by students ***Learning Outcomes: All***

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:** ESKITP4024 P1-5 – Contribute, under supervision, to the preparation of a data analysis assignment; ESKITP4024 P6-9– Assist in the development of data analysis models; ESKITP4024 P10-14– Manage the outcomes from the data analysis assignment; ESKITP4054 P5-9– Manage, under supervision, the maintenance of data design assignments; ESKITP4054 P10-13– Provide others, when requested, with specified information relating to data design activities; ESKITP4055 P1-5– Select and implement appropriate data design processes; ESKITP4055 P6-10 – Manage the progress of data design assignments; ESKITP4055 P11-15 – Review the effectiveness of data design deliverables.

Assessments
Global Assignment (100%)
See also Section 3 above

5.8. Dynamic Websites

Title:	Dynamic Websites

RQF code:	Y/503/4786	**Credits**	20	**Level**	5

Guided Learning Hours	78 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Understand the various tools and techniques used for Web Application development	1.1 Define and explain web applications and their functions 1.2 Identify and evaluate appropriate web application development tools for a given scenario 1.3 Identify and evaluate appropriate web application development techniques for a given scenario
2. Be able to develop data-driven websites	2.1 Design and code a web-based user interface appropriate to a given problem 2.2 Design and build a database which interacts with a web page 2.3 Create scripts to facilitate data transfer between a database and a web page. 2.4 Evaluate the functionality of a database-driven website in the context of a given problem
3. Be able to apply the various tools and techniques used to build data-driven websites	3.1 Select appropriate web development tools for a given scenario 3.2 Use a development tool to develop a dynamic web solution which addresses a given scenario
4. Understand the functions of web services	4.1 Define and explain a range of web services (e.g XML, RSS, SOAP). 4.2 Evaluate and select the optimal web service solution for a given problem 4.3 Appraise the potential business benefits of web services
5. Be able to create and deploy web services	5.1 Use one or more web services to build a dynamic website which addresses a given business problem 5.2 Evaluate a dynamic website which utilises web services in the context of business objectives

Syllabus content	
Topic	**Course coverage**
1. Introduction to The Unit	• Introduction to the unit • Web applications and their functions • Web development tools and frameworks • Client-server applications • Static -v- dynamic websites • Web service solutions ***Learning outcome 1***
2. Designing and Coding A Website	• Considerations (colours, fonts, images, file sizes, content) • CSS3 and Semantic structure • HTML5 • Responsive design (layout, flexible images and media – dynamic resizing or CSS) • Templates (bootstrap) ***Learning outcome 2***
3. Design and Developing for Mobile Websites	• CCS3 • Flexible layouts • Resizing and adjustments • Code to redirect mobile users • Location map • Web form ***Learning outcome 2***
4. Design and Build a Database (1)	• PHP (source code and HTML code, creating tables, manipulating tables and querying databases) ***Learning outcome 2***
5. Design and Build A Database (2)	• MySQL (what it is, database queries, data types and ranges, SQL statements) • Ruby (what it is, how it can be used, simple coding, basic templates, simple web application) ***Learning outcome 2***
6. Using Scripts (1)	• Interactive elements (consumer suggestions, displays) • Java/jQuery (loops, arrays, arithmetic operations, strings) ***Learning outcome 2***
7. Using Scripts (2)	• jQuery for mobile devices (HTML 5, CCS3, JavaScript and AJAX) • XML (difference with HTML and examples linked to carrying data) • JSON ***Learning outcome 2***

8. Web Development Tools	• Cookies and Sessions • Ajax Database Development ***Learning outcome 3***
9. Mobile Application Development Integration	• Developing mobile applications • DOM, • XSLT (content delivered to mobile devices) • API • Links to mobile applications ***Learning outcome 3***
10. Web Services	• Examples – WSDL, SOAP • Streaming (RSS) • Web API further ***Learning outcome 4***
11. Building A Dynamic Website	• Consideration of security issues (cyber security/SSL and encryption) • Integration • Testing (google mobile and HTML code) ***Learning outcome 5***
12. Evaluating Websites	• Use of web application • Functionality of data driven website • Web service solutions • Business benefits of web services ***Learning outcome 5***

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:** ESKITP4074 P1-4 – Prepare, under supervision, for system/solution/service design activities; ESKITP4074 P5-8 – Assist with the design of system/solution/service design; ESKITP4074 P9-11 – Monitor the progress of system/solution/service design activities; ESKITP5015v2 P4-7- Initiate systems development activities; ESKITP5015v2 P8-12- Manage systems development activities; ESKITP5022v2 - Perform software development activities

Assessments
Global Assignment (100%)
See also Section 3 above

5.9. Ethical Hacking and Information Security Assessments

Title:	Ethical Hacking and Information Security Assessments

RQF code:	A/618/1452	**Credits**	20	**Level**	5

Guided Learning Hours	80	**Total Qualification Time**	200 hours

Learning Outcomes The Learner will:	**Assessment Criteria;** The Learner can:
1. Assess ethical and legal requirements of security assessment.	1.1 Evaluate the current security trends 1.2 Describe the elements of information security 1.3 Explain information security threats and attack vectors 1.4 Describe hacking concepts, types, and phases 1.6 Explain information security controls 1.6 Explain the penetration testing process 1.7 Discuss information security Acts and Laws
2. Understand different types of footprinting, tools and countermeasures	2.1 Describe footprinting concepts 2.2 Perform footprinting through multiple platforms including; search engines, web services, social networking sites, website, email and competitive intelligence 2.3 Perform Whois, DNS, network and social engineering footprinting 2.4 Use different footprinting tools and apply best practice 2.5 Perform footprinting penetration testing
3. Understand different types of network scanning techniques and enumerations countermeasures.	3.1 Describe the network scanning concepts 3.2 Use various scanning tools and techniques to perform scanning penetration testing and to check for live systems and open ports 3.3 Scan beyond intrusion detection system (IDS) and firewalls 3.4 Perform banner grabbing 3.5 Draw network diagrams using network discovery tools

4. Analyse different enumerations techniques and different vulnerabilities	4.1 Describe the enumeration concepts 4.2 Explain different techniques for NetBIOS, SNMP, LDAP, NTP, SMTP AND DNS enumeration 4.3 Explain other enumerations such as IPsec, VoIP, RPC, and Linux/Unix enumeration 4.4 Understand vulnerability research and vulnerability classification 4.5 Describe different characteristics of good vulnerability assessment solutions 4.6 Explain different types of vulnerability assessment tools
5. Understand the system hacking methodology	5.1 Describe the CEH Hacking Methodology 5.2 Explain different techniques to gain access to the system and apply privilege escalation 5.3 Explain different techniques to create and maintain remote access to the system 5.4 Describe different types of rootkits 5.5. Explain steganography and steganalysis techniques 5.6 Apply different techniques to hide the evidence of compromise 5.7 Perform system hacking penetration testing
6. Compare and contrast different types of malware	6.1 Describe the concepts of malware and malware propagation techniques 6.2 Describe the concepts of Viruses, Trojans and Worms, their types, and how they infect files / systems 6.3 Perform malware analysis and explain different techniques to detect malware 6.4 Perform malware penetration testing and apply malware countermeasures
7. Assess various packet sniffing techniques	7.1 Describe the packet sniffing concepts 7.2 Explain different MAC and DHCP attacks 7.3 Describe ARP and DNS poisoning 7.4 Use different packet sniffing tools and apply packet sniffing countermeasures 7.5 Apply various techniques to detect packet sniffing 7.6 Perform packet sniffing penetration testing
8. Assess various social engineering and Dos/DDoS attack techniques.	8.1 Describe social engineering concepts and techniques to perform it. 8.2 Describe identity theft and perform impersonation on social networking sites 8.3 Apply social engineering and identify theft countermeasures 8.4 Perform social engineering and DoS/DDoS penetration testing 8.5 Describe the DoS/DDoS concepts, explain different DoS/DDoS attack tools and the techniques used to perform DoS/DoS. 8.6. Apply best practices to mitigate DoS/DDoS attacks

Syllabus content	
Topic	**Course coverage**
1. Introduction to Ethical Hacking	• Information security • Hacking, Ethical Hacking concepts and penetration testing concepts • Information Security Controls ***Learning Outcomes: 1***
2. Footprinting and Reconnaissance	• Footprinting Methodology • Footprinting Tools • Footprinting Countermeasures • Footprinting Penetration Testing ***Learning Outcomes: 2***
3. Scanning Networks	• Network Scanning Concepts • Network Scanning Techniques • Network Scanning Pen Testing • Network Scanning Beyond IDS and Firewall ***Learning Outcomes: 3***
4. Enumeration	• Enumeration Concepts • Enumeration Countermeasures • Enumeration Pen Testing ***Learning Outcomes: 4***
5. Vulnerability Analysis	• Vulnerability Assessment Concepts • Assessment Solutions • Scoring Systems • Assessment Tools • Assessment Reports ***Learning Outcomes: 4***
6. System Hacking – Part One	• System Hacking Concepts • Cracking Passwords • Escalating Privileges ***Learning Outcomes: 5***
7. System Hacking – Part Two	• Escalating Privileges • Executing Applications • Hiding Files • Covering Tracks • Penetration Testing ***Learning Outcomes: 5***
8. Malware Threats – Part One	• Malware Concepts • Trojan ***Learning Outcomes: 6***

9. Malware Threats – Part Two	• Virus and Worm • Malware Analysis • Countermeasures • Malware Penetration Testing ***Learning Outcomes: 6***
10. Packet Sniffing	• Packet Sniffing Concepts • Packet Sniffing Techniques ***Learning Outcomes: 7***
11. Social Engineering	• Social Engineering Concepts • Social Engineering Techniques ***Learning Outcomes: 8***
12. Denial-of-Service	• DoS/DDoS Concepts • DoS/DDoS Attack Techniques ***Learning Outcomes: 8***

Assessments
Global Assignment (100%)
See also Section 3 above

5.10. Information Systems Analysis

Title:	Information Systems Analysis

RQF code:	Y/503/4769	**Credits**	20	**Level**	5

Guided Learning Hours	63 hours (incl. 3-hour exam)	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Understand soft and hard approaches to the analysis of information systems	1.1 Explain the key aspects of Soft Systems Methodology (SSM) and related approaches 1.2 Explain the key aspects of Structured Systems Analysis and Design Methodology (SSADM) and related approaches 1.3 Identify business situations where a soft or hard systems analysis might be appropriate 1.4 Explain combined soft/hard frameworks (such as Multiview).
2. Understand the techniques associated with requirements capture	2.1 Explain and apply stakeholder analysis techniques 2.2 Explain and apply CATWOE
3. Understand the different viewpoints associated with IS methodologies	3.1 Explain object-oriented IS methodologies 3.2 Explain organisation-oriented IS methodologies 3.3 Explain process-oriented IS methodologies 3.4 Explain people-oriented IS methodologies 3.5 Evaluate IS methodologies of different types in the context of a business scenario
4. Be able to apply various analytical techniques for understanding a complex organisational environment	4.1 Evaluate a knowledge-based view of organisations 4.2 Define and apply techniques for analysing the business environment (such as PEST and SWOT)
5. Understand the relationship between the economic, social, political and technical factors influencing a business problem	5.1 Analyse the economic, social, political and technical aspects of a business systems problem 5.2 Evaluate the different aspects of a business problem in the context of potential solutions
6. Understand and apply the principles of interface design and the requirements and characteristics of users that motivate these	6.1 Design or evaluate an interface with regard to the characteristics of its users 6.2 Explain the requirements of computer users and how good design can address these

Syllabus content	
Topic	**Course coverage**
1. Introduction to Information Systems Analysis	• An introduction to the Unit • Define and explain the term information system • Identify types and examples of information systems • Discuss Information systems analysis in the context of the SDLC • Define and explain the abbreviation SDLC • Define and explain analysis and requirements capture • Discuss the role of analysis and requirements capture in specific contexts • Define the term methodology • Determine the requirement for different methodologies • Present an overview of Information System Analysis and Design methodologies • Research and discuss case studies **Learning Outcome: 1**
2. Hard Approaches to the Analysis of Information Systems	• Define and explain the term hard approach to systems analysis • Identify examples of hard approach methodologies • Identify business situations where a hard approach to systems analysis might be appropriate • Define and explain the abbreviation SSADM • Identify and discuss the advantages of SSADM • Identify and discuss the disadvantages of SSADM • Define and explain the abbreviation DFD • Define and explain terminology associated with DFDs • Illustrate the use of DFDs • Construct DFDs • Provide solutions to business problems using DFDs **Learning Outcome: 1**
3. Soft Approaches to the Analysis of Information Systems	• Define and explain the term soft approach to systems analysis • Identify examples of soft approach methodologies • Identify business situations where a soft approach to systems analysis might be appropriate • Define and explain the abbreviation SSM • Identify and discuss the advantages of SSM • Identify and discuss the disadvantages of SSM • Provide solutions to business problems using SSM • Research and discuss case studies **Learning Outcome: 1**

4.	Combined Soft/Hard Approaches to the Analysis of Information Systems	• Define and explain the term combined soft/hard approach to systems analysis • Identify examples of combined soft/hard approach methodologies • Identify business situations where a combined soft/hard approach to systems analysis might be appropriate • Define and explain the term Multiview • Identify and discuss the advantages of Multiview • Identify and discuss the disadvantages of Multiview • Provide solutions to business problems using Multiview • Research and discuss case studies • Compare and contrast soft, hard and combined approaches to systems analysis ***Learning Outcome: 1***
5.	Techniques Associated with Requirements Capture	• Define and explain the term stakeholder • Identify and discuss types of stakeholder analysis techniques • Define and illustrate the Stakeholder Analysis Matrix • Define and explain the abbreviation CATWOE • Identify and discuss the advantages of CATWOE • Identify and discuss the disadvantages of CATWOE • Provide solutions to business problems using CATWOE • Evaluate CATWOE ***Learning Outcome: 2***
6.	Organisation-Oriented and People-Oriented IS Methodologies	• Define and explain the term organisation-oriented IS methodology • Identify the types of organisation-oriented IS methodologies • Identify and discuss the advantages of organisation-oriented methodologies • Identify and discuss the disadvantages of organisation-oriented methodologies • Evaluate and discuss an organisation-oriented methodology in the context of a business scenario • Define and explain the term people-oriented IS methodology • Identify the types of people-oriented IS methodologies • Identify and discuss the advantages of people-oriented methodologies • Identify and discuss the disadvantages of people-oriented methodologies • Define and explain the abbreviation ETHICS • Evaluate and discuss the ETHICS methodology in the context of a business scenario • Define and explain the term Agile methodology • Evaluate and discuss the Agile methodology in the context of a business scenario ***Learning Outcome: 3***

7.	Process-Oriented IS Methodologies	• Define and explain the term process-oriented IS methodology • Identify the types of process-oriented IS methodologies • Identify and discuss the advantages of process-oriented methodologies • Identify and discuss the disadvantages of process-oriented methodologies • Define and explain the term Yourdon methodology • Evaluate and discuss the Yourdon methodology in the context of a business scenario • Define and explain the abbreviation POEM • Evaluate and discuss the POEM methodology in the context of a business scenario ***Learning Outcome: 3***
8.	Object-Oriented IS Methodologies	• Define and explain the term object-oriented IS methodology • Identify the types of object-oriented IS methodologies • Define and explain terminology associated with an object oriented methodology • Illustrate the construction of an object-oriented methodology • Identify and discuss the advantages of object-oriented methodologies • Identify and discuss the disadvantages of object-oriented methodologies • Evaluate and discuss an object-oriented methodology in the context of a business scenario ***Learning Outcome: 3***
9.	Analytical Techniques for Understanding a Complex Organisational Environment	• Define and explain the term knowledge-based view of organisations • Identify and discuss the advantages of an organisation-oriented methodology • Identify and discuss the advantages of an organisation-oriented methodology • Define and explain the abbreviation SWOT • Demonstrate how SWOT can be used • Apply SWOT to a business scenario • Define and explain the abbreviation PEST • Demonstrate how PEST can be used • Apply PEST to a business scenario ***Learning Outcome: 4***

10. Analysis of Factors Influencing a Business Problem	• Analyse the economic aspects of a business systems problem • Evaluate and discuss the economic aspects of a business systems problem in the context of potential solutions • Analyse the social aspects of a business systems problem • Evaluate and discuss the social aspects of a business systems problem in the context of potential solutions • Analyse the political aspects of a business systems problem • Evaluate and discuss the political aspects of a business systems problem in the context of potential solutions • Analyse the technical aspects of a business systems problem • Evaluate and discuss the technical aspects of a business systems problem in the context of potential solutions • Research and discuss case studies ***Learning Outcome: 5***
11. Principles of Interface Design and the Requirements and Characteristics of Users that Motivate These	• Identify the principles and good practice of interface design • Analyse the requirements of the users of an interface • Analyse the characteristics of the users of an interface • Demonstrate how good interface design can address the requirements and characteristics of an interface user ***Learning Outcomes: 6***
12. Design or Evaluate an Interface with regard to the Requirements and Characteristics of its Users	• Design an interface that addresses the requirements and characteristics of an interface user • Evaluate and discuss whether interface design principles have been applied to an interface • Evaluate and discuss whether interface design principles have addressed the requirements and characteristics of the interface user ***Learning Outcomes: 6***

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:** ESKITP4014 P1-5 – Carry out IT/technology architecture activities ESKITP4014 P6-11 – Contribute to information activities relating to IT/technology architecture models ESKITP4024 P1-5 – Contribute, under supervision, to the preparation of a data analysis assignment; ESKITP4024 P6-9 – Assist in the development of data analysis models ESKITP6013 P1-5 - Contribute to information management ESKITP6014 P1-3 - Manage the classification and categorisation of information

Assessments
Global Assignment (100%)
See also Section 3 above

5.11. **Information Systems and Organisations**

Title:	Information Systems and Organisations

RQF code:	H/617/8478	**Credits**	20	**Level**	5

Guided Learning Hours	48 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Analyse the use of Information Systems (IS) within organisations	1.1 Assess the importance of IS in organisations as a store for data, information and knowledge 1.2 Discuss the different social contexts and stakeholder perspectives of IS 1.3 Understand the relationship between IS and process change within organisations
2. Examine the many internal and external uses of an organisation's IS	2.1 Explain how IS contributes to the management of knowledge within organisations 2.2 Analyse how interactions with customers and external parties can be managed using IS
3. Critically evaluate the costs and benefits of a range of IS systems	3.1 Discuss the costs and benefits involved in implementing new IS 3.2 Analyse the importance of having a balanced portfolio of IS that supports organisational strategy
4. Critically evaluate the cultural, structural and political aspects of IS	4.1 Assess the effects of IS on organisational structure and central decision-making 4.2 Analyse the political aspects of IS
5. Examine the issues associated with human interaction with IS	5.1 Assess the IS needs of a range of individuals 5.2 Discuss the legal and ethical issues surrounding IS 5.3 Analyse how IS can be used to increase commitment and control in an organisation 5.4 Describe the issues surrounding the acceptance of new technology
6. Assess the effects of technological change on IS and the organisations	6.1 Evaluate the process of implementing new IS 6.2 Explain how to identify and influence stakeholders when implementing new IS

Syllabus content	
Topic	**Course coverage**
1. Organisations and Information Systems	• Data, information and knowledge. • The uses and importance of IS to organisations ***Learning Outcome: 1***
2. Social Contexts and Perspectives on IS	• Social contexts within organisations Different perspectives • Technology interaction with the organisation ***Learning Outcome: 1***
3. Internal IS and Enterprise Systems	• Evolution and classification of IS • Information flows • Processes • Enterprise wide systems ***Learning Outcome: 1***
4. Organisational Strategy and IS	• Alignment to organisational needs • Ensuring the IS portfolio supports the business and supports stakeholders ***Learning Outcome: 2***
5. Evaluating IS	• Sources of cost and benefit • Tangible and intangible factors • Formal-rational evaluation • Wider criteria for evaluating IS ***Learning Outcome: 3***
6. Cultural, Structural and Political Aspects of IS	• Culture and IS • How IS affects structure • Central and local decision making • Political aspects of IS ***Learning Outcome: 4***
7. People and IS Interpretation	• Human needs • Information ownership • Legal and ethical issues • Data security ***Learning Outcome: 5***
8. The 21st Century Organisation	• Using IS for commitment and control • Managing distributed work • Evolution of working practices ***Learning Outcome: 5***
9. User Acceptance and the Socio-technical Approach	• Technology acceptance and the socio-technical approach • HCI and usability considerations ***Learning Outcome: 5***

10. IS and the Customer	• Dealing with customers, suppliers and partners • eBusiness ***Learning Outcome: 2***
11. IS and Organisational Change	• Implementing IS and the context of change • Critical aspects of a project • Understanding models of change • Identifying and influencing stakeholders ***Learning Outcome: 6***
12. Benefits Management	• Characteristics of successful IS implementations ***Learning Outcome: 6***

Related National Occupational Standards (NOS)
Sector Subject Area: Management and Leadership National Occupational Standards 2008 **Related NOS:** CFAMLE4 Promote the use of technology within your organisation **Sector Subject Area:** Business and Administration (2013) **Related NOS:** CFABAD111 Support the design and development of information systems CFABAD121 Support the management and development of an information system CFABAD122 Manage and evaluate an information system

Assessments
Global Assignment (100%)
See also Section 3 above

5.12. Network Security and Cryptography

Title:	Network Security and Cryptography

RQF code:	R/503/4785	**Credits**	20	**Level**	5

Guided Learning Hours	72 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Understand the most common types of cryptographic algorithm	1.1 Explain the most common types of cryptographic algorithm (i.e. block ciphers, public-key ciphers and hash algorithms) 1.2 Select and justify an appropriate algorithm for a particular purpose
2. Understand the Public-key Infrastructure	2.1 Describe the Public-key Infrastructure 2.2 Explain the role of Certification Authorities
3. Understand security protocols for protecting data on networks	3.1 Explain the concept of Web security with TLS 3.2 Describe Email security mechanisms 3.3 Describe disk encryption mechanisms 3.4 Deploy file encryption mechanisms
4. Be able to digitally sign emails and files	4.1 Explain digital signatures 4.2 Demonstrate applying for and deploying a Digital Certificate 4.3 Digitally sign an email
5. Understand Vulnerability Assessments and the weakness of using passwords for authentication	5.1 Explain the need for vulnerability assessments 5.2 Interpret a vulnerability assessment report 5.3 Explain the different authentication mechanisms 5.4 Describe multifactor authentication 5.5 Describe biometrics and their issues
6. Be able to perform simple vulnerability assessments and password audits	6.1 Use port scanners to highlight open ports 6.2 Perform password cracking using dictionary and brute-force methods
7. Be able to configure simple firewall architectures	7.1 Configure access control mechanisms 7.2 Describe the components of a firewall 7.3 Configure a DMZ firewall 7.4 Evaluate the limitations of firewalls 7.5 Apply and manage port forwarding rules
8. Understand Virtual Private Networks	8.1 Explain Virtual Private Networks 8.2 Select an appropriate remote access solution
9. Be able to deploy wireless security	9.1 Explain the vulnerabilities inherent in wireless networks

	9.2 Deploy a secure network architecture for wireless access 9.3 Configure Access Control Lists 9.4 Encrypt and protect the wireless link

Syllabus content	
Topic	**Course coverage**
1. Cryptography Fundamentals	• Cryptographic algorithms including: – AES block cipher – RSA public-key code – SHA hash algorithm ***Learning Outcomes: 1***
2. PKI	• The Public-Key Infrastructure • Certification Authorities and Digital Signatures ***Learning Outcomes: 2 & 4***
3. Web Security	• Browser security and SSL/TLS for encrypted browsing ***Learning Outcomes: 3 & 4***
4. Email Security	• PGP and S/MIME for encrypted and authenticated email ***Learning Outcomes: 3 & 4***
5. Data Protection	• File, disk and portable encryption technologies ***Learning Outcomes: 3***
6. Vulnerability Assessment	• Vulnerability assessment terms and tools: – Port scanners – Password crackers ***Learning Outcomes: 5 & 6***
7. Authentication	• Passwords • Multi-factor authentication • Biometrics ***Learning Outcomes: 5***
8. Access Control	• Packet filtering • Access control lists • NAT • IDS ***Learning Outcomes: 7***
9. Firewalls	• Firewall architectures and their limitations • The DMZ firewall and its limitations ***Learning Outcomes: 7***
10. VPN	• Virtual Private Network technologies and issues ***Learning Outcomes: 7 & 8***

11. Remote Access	• Alternative remote access technologies: – Remote desktops – Web applications ***Learning Outcomes: 7 & 8***
12. Wireless Security	• Wireless security (WEP, WPA, WPA2) • Secure network architectures for wireless deployments ***Learning Outcomes: 9***

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:** ESKITP6023 P1-2 - Contribute to IT/technology security management activities; ESKITP6023 P3-4 - Document IT/technology security management processes; ESKITP6023 P5-7- Assist the management with IT/technology security systems; ESKITP6024 P1-4 - Manage the IT/technology security requirements; ESKITP6024 P5-8 - Carry out IT/technology security management activities

Assessments
Global Examination (50%) Global Assignment (50%)
See also Section 3 above

5.13. **Network Security Threats and Defence Mechanisms**

Title:	Network Security Threats and Defence Mechanisms

RQF code:	F/618/1453	**Credits**	20	**Level**	5

Guided Learning Hours	80	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Understand fundamental networking concepts, analyse protocols and implement established standards.	1.1 Assess the different types of computer networks 1.2 Describe and compare the OSI and TCP/IP network models 1.3 Explain the different types of networks and their topologies 1.4 Describe various network components 1.5 Explain the various protocols in TCP/IP protocol stack 1.6 Explain IP addressing
2. Be able to assess potential vulnerabilities and threats to a network's infrastructure.	2.1 Explain threat, attack, and vulnerability concepts 2.2 Discuss network security concerns 2.3 Discuss the different categories of network security breach and the effects on business continuity 2.4 Discuss the different categories of network security vulnerabilities and network attacks 2.5 Describe the fundamental elements of network security 2.6 Describe the different types of access controls and their mechanisms
3. Understand the working of encryption, protocols and policies.	3.1 Explain network data encryption mechanisms 3.2 Describe Public Key Infrastructure (PKI) 3.3 Describe various network security protocols and network security devices 3.4 Discuss security policies and their hierarchy 3.5 Explain designing, creating and implementing security policies 3.6 Understand the need to enforce and train on security policies 3.7 Discuss various information security related standards, laws and acts
4. Identify and analyse the issues with physical security, operating systems and Network-based applications.	4.1 Discuss the need for physical security, the factors that affect it and the selection of appropriate physical security controls 4.2 Describe various access control authentication techniques

	4.3 Explain workplace security, personnel security, environmental controls and the importance awareness and training 4.4 Explain the purpose of a host, host security, related threats and baselining 4.5 Assess security requirements for different types of servers, hardening of routers and switches 4.6 Understand data / virtualisation security at rest, motion and use
5. Understand the fundamental concept of a Firewall	5.1 Explain firewalls and firewall security concerns 5.2 Discuss firewall technologies and understand the selection of firewall topologies 5.3 Design and configuration of the firewall ruleset and policies 5.4 Discuss the factors to consider before purchasing a firewall solution 5.5 Explain how to deploy, implement, configure and test a firewall 5.6 Describe the management, maintenance and administration of a firewall 5.7 Explain firewall logging, firewall security best practices and measures in avoiding firewall evasion
6. Understand the role and workings of IDS/IPS in network defence.	6.1 Explain different types of intrusions and their indications 6.2 Explain IDPS and the importance of implementing an IDPS 6.3 Describe the role, functions, components of an IDS and how one works 6.4 Describe a staged deployment of NIDS and HIDS 6.5 Describe IDS fine-tuning by minimising false positives and the false negative rate 6.6 Discuss the characteristics of a good IDS implementation, mistakes made and their remedies 6.7 Explain the various types of IDPS implementations and the requirements for selecting an appropriate IDSP product 6.8 Discuss the technologies which complement IDS functionality
7. Understand the purpose of Virtual Private Networks	7.1 Explain how a Virtual Private Network (VPN) functions and be able to describe its components. 7.2 Explain the importance for establishing a VPN 7.3 Describe the implementation for VPN concentrators and functions 7.4 Explain the different VPN technologies 7.5 Discuss the process for selecting the correct VPN technology for your needs

	7.6 Explain VPN topology implementation and functions 7.7 Discuss VPN security concerns and performance

Syllabus content	
Topic	**Course coverage**
1. Computer Network and Defence Fundamentals	• Comparing OSI and TCP/IP • Types of Networks and Topologies • Network Hardware Components • TCP/IP Protocol Stack • IP Addressing • Understanding Computer Network Defence (CND) • CND Process and Approaches ***Learning Outcomes: 1***
2. Network Security Threats, Vulnerabilities, and Attacks	• Network Security Concerns • Types of Network Security Threats, Vulnerabilities and Attacks ***Learning Outcomes: 2***
3. Network Security Controls, Protocols, and Devices – Part One	• Fundamental Elements of Network Security • Network Security Controls ***Learning Outcomes: 2, 3***
4. Network Security Controls, Protocols, and Devices – Part Two	• Network Security Devices • Network Security Protocols ***Learning Outcomes: 2, 3***
5. Network Security Policy Design and Implementation	• What is a Security Policy? • Workplace Plans and Policies ***Learning Outcomes: 3***
6. Physical Security	• Need for Physical Security • Factors Affecting Physical Security • Physical Security Controls • Access Control Authentication Techniques and Other Measures • Workplace and Personnel Security • Laptop Security tool: EXO5 • Environmental Controls • Physical Security: Awareness/Training and Checklists ***Learning Outcomes: 4***

7. Host Security – Part One	• Host and OS Security • User and Password Management • Patch Management • Methods to Secure Host System (Windows) • Install Antivirus Software • Email Security • Enabling Pop-Up Blocker • Windows Log Review and Audit • Configuring Host-Based IDS/IPS • File System Security • Creating and Securing a Windows File Share • Data and File System Encryption • Linux Security • Understanding and Checking Linux File Permissions • Host-Based Firewall Protection with IPtables ***Learning Outcomes: 4***
8. Host Security – Part Two	• Linux Log Review and Audit • Hardening Servers • Logs Review and Audit • Data Security • What is Data Loss Prevention? • Virtualisation Terminologies ***Learning Outcomes: 4***
9. Secure Firewall Configuration and Management	• What Firewalls Do and How Do They Work • Firewall rules • Types of Firewalls • Firewall Technologies and Topologies • Build an Appropriate Firewall Ruleset • Implement Firewall Policy • Firewall Implementation, Deployment and Administration • Firewall Logging • Why Bypass Firewalls? • Secure Firewall Implementation: Best Practices • Firewall Implementation: Recommendations • Firewall Tools ***Learning Outcomes: 5***
10. Secure IDS Configuration and Management – Part One	• Intrusion Detection and Prevention System (IDPS) • Role of an IDS in Network Defence • How does an IDS work? • IDS Components • Intrusion Detection Steps • Types of IDS Implementation • Staged IDS Deployment • Types of IDS Alerts ***Learning Outcomes: 6***

11. Secure IDS Configuration and Management – Part Two	• Characteristics of a Good IDS • IDS Mistakes to avoid • Intrusion Prevention Systems (IPS) Technologies • IPS Placement and Functions • What does an IPS do? • IDS vs IPS • Types of an IPS • IDPS product selection • Complementing an IDS • Vulnerability analysis or assessment systems • File integrity checkers • Honeypot and Padded-Cell System Tools • IDS Evaluation: Snort • IDS/IPS Solutions ***Learning Outcomes: 6***
12. Secure VPN Configuration and Management	• How does a VPN work? • Why Establish a VPN? • VPN Components • VPN Concentrators and Functions • Types of VPNs and Appropriate Selection • VPN Core Functionalities • VPN Technologies, Topologies, Concerns and Security • Improving VPN Speed • Quality of Service (QoS) in VPNs • SLAs for a VPN • VPN Service Providers • Auditing and Testing the VPN • Testing VPN File Transfer • Best Security Practices for VPN Configuration • Recommendations for VPN Connections ***Learning Outcomes: 7***

Assessments
Global Assignment (100%)
See also Section 3 above

5.14. **Principles of Business Operations**

Title:	Principles of Business Operations

RQF code:	Y/617/8476	**Credits**	20	**Level**	5

Guided Learning Hours	48 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Examine the frameworks of operations management	1.1 Evaluate the principles of operations management 1.2 Analyse the key activities in operations management and how they have changed over time 1.3 Analyse the use, design and development of value chains 1.4 Discuss the methods used to measure the performance of operations management activities 1.1 Assess how customers' wants and needs drive operations strategy
2. Analyse the use of technology in operations management	2.1 Examine how new technologies are used in value chains 2.2 Assess how technology is used to create integrated operating systems
3. Assess the design of goods and services	3.1 Examine how goods and services are designed 3.2 Examine how production and design processes are developed
4. Analyse how operations management processes are developed	4.1 Assess the layout of facilities and processes 4.2 Examine the need for workplace and job design 4.3 Discuss the components and design of supply chains 4.4 Assess the process and the use of forecasting in short and long-term decisions relating to capacity 4.5 Discuss the need for accurate resource planning and scheduling 4.6 Analyse the importance of various quality measures in operations management

5. Evaluate the use of lean operations	5.1 Examine the underlying principles of lean operations 5.2 Analyse the use of 'just-in-time' systems

Syllabus content	
Topic	**Course coverage**
1. Introduction to Operations	• The nature of operations and introduction to Business Operations concepts ***Learning Outcome: 1***
2. Value Chains and Global Operations	• Value chain design and development and their context in global operations ***Learning Outcome: 1***
3. Frameworks for Operations Management	• The scope of performance management and designing performance management and measurement systems ***Learning Outcome: 1***
4. Operations for Business Competitiveness	• Operations strategy and competitive priorities – understanding customers' wants and needs ***Learning Outcome: 1***
5. Using Technology	• Issues relating to operations design technologies implementation and management ***Learning Outcome: 2***
6. Goods and Services	• Designing goods and services in an operations context ***Learning Outcome: 3***
7. Facilities Design	• Facility design and layout decisions in an operations context ***Learning Outcome: 4***
8. Supply Chains and Facilities Location	• Designing supply chains and facilities location decisions ***Learning Outcome: 4***
9. Capacity	• Managing operations capacity and forecasting for business operations ***Learning Outcome: 4***
10. Resources	• Managing operations resource planning and scheduling ***Learning Outcome: 4***
11. Quality	• Managing operations quality in a global context ***Learning Outcome: 4***
12. Managing Operations	• Lean operations and just-in-time systems ***Learning Outcome: 5***

Related National Occupational Standards (NOS)
Sector Subject Area: Management and Leadership National Occupational Standards 2008 **Related NOS:** CFAMLB1 Develop and implement operational plans for your area of responsibility CFAMLF3 Manage business processes **Sector Subject Area:** Business and Administration (2013) **Related NOS:** CFABAG121 Contribute to decision-making in a business environment

Assessments
Global Assignment (100%)
See also Section 3 above

5.15. **Professional Issues in IT**

Title:	Professional Issues in IT

RQF code:	R/503/4768	**Credits**	20	**Level**	5

Guided Learning Hours	60 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Understand the social, ethical and professional issues essential to the IT profession	1.1 Identify and explain common legal, social and professional standards issues applicable to a professional working in the IT industry 1.2 Appraise the ethical aspects of various scenarios in the development, deployment and use of IT systems 1.3 Explain the social, legal and professional standards issues in the context of various scenarios in the development, deployment and use of IT systems
2. Understand a project management life cycle and associated techniques	2.1 Explain the project management lifecycle in the context of an IT project 2.2 Identify the key phases of the project management lifecycle in relation to a given scenario 2.3 Develop project management strategies for specified software development and maintenance projects
3. Understand how to deploy a software application	3.1 Explain the need for structured and planned deployment of a software application 3.2 Analyse the potential risks and problems of deploying a software application in a given scenario 3.3 Specify a software deployment process for a given scenario
4. Understand risks and the management of them in software projects	4.1 Explain the need for detailed risk analysis in a software engineering context 4.2 Explain risk management techniques 4.3 Analyse risks and risk management strategies in the context of an IT project
5. Understand the principles and techniques of IT service management	5.1 Analyse an IT service case study in respect to management requirements 5.2 Analyse objectives in an IT service case study 5.3 Apply management techniques to a problem situation in order to achieve objectives
6. Be able to design software quality policies and procedures	6.1 Define and explain the concept of software quality 6.2 Explain the use of metrics for software quality management and apply these to a given scenario

	6.3 Evaluate the requirements for software quality policies and procedures in a problem context 6.4 Design software quality policies and procedures and apply these to a given scenario

Syllabus content	
Topic	**Course coverage**
1. Understanding IT Standards and Issues	• Introduction to the Unit • Ethics – What are ethics and why are they relevant? • Social, legal and professional issues in IT and their potential impact • Why understanding standards and issues is so important ***Learning Outcome: 1***
2. Applying IT Standards and Issues	• Applying social, ethical, legal and professional standards and issues to the IT profession and projects • Analysing the effects of such issues and standards on the IT industry ***Learning Outcome: 1***
3. IT Project Management	• What is IT project management and why is it necessary? • Identifying and understanding project management lifecycles and phases • Understanding project management strategies ***Learning Outcome: 2***
4. Applied IT Project Management	• Identifying and applying project management lifecycle phases and strategies to IT projects • Analysing, evaluating, concluding and reporting findings ***Learning Outcome: 2***
5. Software Application Deployment	• What is software application deployment? • Its place within an IT project's lifecycle • How to identify potential issues • Software application deployment standards ***Learning Outcome: 3***
6. Applying Software Application Deployment to Projects	• Identifying deployment risks and issues • Creating a software deployment procedure for an IT project • Explanation of software deployment procedure ***Learning Outcome: 3***
7. IT Risk Management	• What is risk? • Risk management and the techniques employed • Risk identification and analysis in IT projects • The consequences of not planning for risk • Reactive vs. proactive ***Learning Outcome: 4***

8. Applying, Evaluating and Managing Risk Analysis	• Applying risk analysis and risk management to an IT project • Evaluating findings • Reporting results ***Learning Outcome: 4***
9. IT Service Management (ITSM)	• What is IT service management? • Where is ITSM focused? • Why is ITSM important? • ITSM International Standards ***Learning Outcome: 5***
10. Analysing and Applying IT Service Management	• Analysing and applying IT service management • Evaluation of ITSM – advantages and disadvantages ***Learning Outcome: 5***
11. Software Quality Policies and Procedures	• Understanding quality within IT • What are quality procedures and policies? • Why software quality procedures are important • Measuring quality • Theory of applying quality procedures to IT projects • External standards ***Learning Outcome: 6***
12. Applying Software Quality	• Writing a software quality policy • Applying software quality procedures • Revision of Unit content • Assessment Clinic ***Learning Outcome: 6***

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:** ESKITP4074 P9-11 – Monitor the progress of system/solution/service design activities; ESKITP5015v2 P13-15 - Monitor, analyse and report on systems development activities; ESKITP5024 P1-5 - Plan software development activities; ESKITP5024 P13-16 - Control software development activities; ESKITP5024 P17-22 - Contribute to the management of software development; ESKITP5034 P5-8 - Contribute to the communication of the results of IT/Technology solution testing; ESKITP5035 P4-10 - Manage testing activities

Assessments
Global Assignment (100%)
See also Section 3 above

6. 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.

Grade Descriptors incorporate characteristics intended to provide a general indication of assessment performance in relation to each Unit's Learning Outcomes in this specification. 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 (see *Appendix 2*). Certificates which contain your qualification grade and pass mark are then dispatched to Centres.

7. 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.

Appendix 1 Qualification Documentation

The following NCC Education documentation has been referred to in this specification:

- Reasonable Adjustments and Special Considerations Policy
- Instructions for Conducting Examinations
- Assessment Instructions
- Activity Schedule
- Centre Handbook

All documentation, together with access to NCC Education's online resources, is available to Centres and (where applicable) candidates who have registered for assessment.

Appendix 2 Grade Descriptors

The grade descriptors Pass, Merit and Distinction are awarded to successful candidates. The following are characteristics intended to provide a general indication of assessment performance in relation to each Learning Outcome in this specification.

Grade descriptors for Agile Development

Learning Outcome	Pass	Merit	Distinction
Understand the background to Agile development	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand the roles within an Agile development team	Provides consistent interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides consistently critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.
Understand the various Agile development techniques	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.
Understand an Agile development lifecycle	Has adequate awareness of different perspectives or approaches within the area of study	Has sound, informed awareness of different perspectives or approaches within the area of study	Has comprehensive, well-informed awareness of different perspectives or approaches within the area of study
Understand the principles associated with an Agile development approach	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results
Be able to apply an Agile development approach to a particular project scenario	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.

Grade descriptors for Analysis, Design and Implementation

Learning Outcome	Pass	Merit	Distinction
Understand the seamless transition from OO analysis to OO design.	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand how to convert OO analysis and design models to code	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.
Understand the quality attributes associated with an OO development	Has adequate awareness of different perspectives or approaches within the area of study	Has sound, informed awareness of different perspectives or approaches within the area of study	Has comprehensive, well-informed awareness of different perspectives or approaches within the area of study
Understand the concept of maintenance within an OO development environment	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.
Be able to produce OO analysis and design models using a case tool	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Be able to convert OO analysis and design models to code using an appropriate IDE	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.

Grade descriptors for Artificial Intelligence

Learning Outcome	Pass	Merit	Distinction
Understand the importance of AI and its applications.	Has adequate knowledge of both well-established theories and concepts within the area of study.	Has very good levels of knowledge of both well-established theories and concepts within the area of study.	Has a meticulous knowledge of both well-established theories and concepts within the area of study.
Apply a range of well-established AI search strategies and knowledge representation techniques in problem solving.	Demonstrates an appropriate use of theoretical models and therefore adequately assesses the significance of collected data, whilst adequately acknowledging the limitations of the research.	Demonstrates a very good use of theoretical models and therefore accurately assesses the significance of collected data, whilst acknowledges the limitations of the research in detail.	Demonstrates excellent to outstanding use of theoretical models and therefore consistently assesses the significance of collected data, whilst insightfully acknowledging the limitations of the research.
Assess a range of well-established techniques for reasoning with uncertain knowledge.	Provides a satisfactory assessment of information and adequately compares alternative methods and techniques.	Provides a very good assessment of information and accurately compares alternative methods and techniques.	Provides an excellent to outstanding assessment of information and meticulously compares alternative methods and techniques.
Understand a range of machine learning techniques.	Can adequately identify, analyse and communicate principles and concepts and can satisfactorily recognise competing perspectives.	Can precisely identify, analyse and communicate principles and concepts and can accurately recognise competing perspectives.	Can comprehensively identify, analyse and communicates principles and concepts and can critically recognise competing perspectives.
Understand the range of AI techniques that are being applied in industry or research.	Can adequately identify, analyse and communicate principles and concepts and can satisfactorily recognise competing perspectives.	Can precisely identify, analyse and communicate principles and concepts and can accurately recognise competing perspectives.	Can comprehensively identify, analyse and communicates principles and concepts and can critically recognise competing perspectives.
Implement and evaluate a range of AI models and techniques for solving real-world problems.	Selects appropriate design principles/ techniques to sufficiently inform a range of approaches for AI model development and evaluation.	Selects accurate design principles/techniques to precisely inform a range of approaches for AI model development and evaluation.	Selects sophisticated design principles/techniques to critically inform a range of approaches for AI model development and evaluation.

Grade descriptors for Business IT Project

Learning Outcome	Pass	Merit	Distinction
Plan and manage the development of a computing artefact	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Gather and evaluate requirements for an IT project	Provide a reasonable assessment of the subject; Ideas are generally coherent	Provide a generally strong assessment with some well-reasoned assumptions; Ideas are consistently coherent	Provide a consistently strong assessment with well-reasoned and original assumptions; All ideas are highly coherent
Conduct research to support the development of a computing artefact	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Employ software engineering techniques in the development of a computing artefact	Demonstrate ability to perform all techniques	Demonstrate ability to perform all techniques consistently well	Demonstrate ability to perform all techniques to the highest standard
Evaluate the success of a computing artefact	Provide a reasonable assessment of the subject; Ideas are generally coherent	Provide a generally strong assessment with some well-reasoned assumptions; Ideas are consistently coherent	Provide a consistently strong assessment with well-reasoned and original assumptions; All ideas are highly coherent

Grade descriptors for Computer Forensics and Incident Investigation

Learning Outcomes	Pass	Merit	Distinction
Understand the fundamental concept of computer forensics, incident response, and different types of cybercrimes	Can adequately determine, adapt and use appropriate methods to reach appropriate solutions	Can soundly determine, adapt and use appropriate methods to reach established and appropriate solutions	Can coherently determine, adapt and use appropriate methods to reach well established and highly appropriate solutions
Recognise the roles and responsibilities of a forensic investigator	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Know the various phases involved in the computer forensic investigation process and the importance of chain of custody	Can adequately determine, adapt and use appropriate methods to reach appropriate solutions	Can soundly determine, adapt and use appropriate methods to reach established and appropriate solutions	Can coherently determine, adapt and use appropriate methods to reach well established and highly appropriate solutions
Analyse the physical and logical structure of a hard disk	Use appropriate research to inform actions/ conclusions	Use detailed research to inform actions/ conclusions	Use thorough and detailed research to inform well supported actions/ conclusions

Comprehend various types of file systems such as Windows, Linux, Mac OS and analyse various RAID storage systems.	Demonstrates adequate ability to evaluate actions methods and results	Demonstrates sound ability to evaluate actions methods and results	Demonstrates comprehensive ability to evaluate actions methods and results
Understand the importance of data acquisition and determine the best acquisition method and tools	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Identify the goals, challenges and techniques of anti-forensics	Demonstrates adequate ability to evaluate actions methods and results	Demonstrates sound ability to evaluate actions methods and results	Demonstrates comprehensive ability to evaluate actions methods and results
Understand how to collect and examine volatile and non-volatile data in Windows and Linux machines	Demonstrates adequate ability to evaluate actions methods and results	Demonstrates sound ability to evaluate actions methods and results	Demonstrates comprehensive ability to evaluate actions methods and results

Grade descriptors for Computing Project

Learning Outcome	Pass	Merit	Distinction
Identify a suitable computing artefact and development method	Utilise adequate reasoning to inform selection	Utilise sound reasoning to inform appropriate selection	Utilise highly appropriate and original reasoning to inform appropriate selection
Project manage the analysis, design, development and deployment of a computing artefact	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Carry out the analysis for a computing artefact	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Design a computing artefact	Provide adequate design to address the specification	Provide detailed and appropriate design to address the specification	Provide wholly appropriate and innovative design that meets the specification
Develop a computing artefact	Show adequate development	Show sound and appropriate development	Show innovative and highly appropriate development
Test a computing artefact	Demonstrate adequate knowledge of testing methodologies and ability to implement	Demonstrate sound knowledge of testing methodologies and ability to implement	Demonstrate exceptional knowledge of testing methodologies and ability to implement

Grade descriptors for Database Design and Development

Learning Outcome	Pass	Merit	Distinction
Understand the enterprise application of database systems	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand how to enhance the design of and further develop a database system	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Be able to enhance a logical database design	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.
Be able to develop a physical database design	Use appropriate research to inform actions/ conclusions.	Use detailed research to inform actions/ conclusions.	Use thorough and detailed research to inform well supported actions.
Be able to enhance a database system using SQL	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.

Grade descriptors for Dynamic Websites

Learning Outcome	Pass	Merit	Distinction
Understand the various tools and techniques used for Web Application development	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results
Be able to develop data-driven websites	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Be able to apply the various tools and techniques used to build data-driven websites	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results
Understand the functions of web services	Has adequate awareness of different perspectives or approaches within the area of study	Has sound, informed awareness of different perspectives or approaches within the area of study	Has comprehensive, well-informed awareness of different perspectives or approaches within the area of study
Be able to create and deploy web services	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.

Grade descriptors for Ethical Hacking and Information Security Assessments

Learning Outcomes	Pass	Merit	Distinction
Assess ethical and legal requirements of security assessment.	Demonstrates adequate ability to evaluate actions methods and results	Demonstrates sound ability to evaluate actions methods and results	Demonstrates comprehensive ability to evaluate actions methods and results
Understand different types of footprinting, tools and countermeasures	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Understand different types of network scanning techniques and enumerations countermeasures.	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Analyse different enumerations techniques and different vulnerabilities	Demonstrates adequate ability to evaluate actions methods and results	Demonstrates sound ability to evaluate actions methods and results	Demonstrates comprehensive ability to evaluate actions methods and results
Understand the system hacking methodology	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Compare and contrast different types of malware	Use appropriate research to inform actions/ conclusions	Use detailed research to inform actions/ conclusions	Use thorough and detailed research to inform well supported actions/ conclusions
Assess various packet sniffing techniques	Demonstrates adequate ability to evaluate actions methods and results	Demonstrates sound ability to evaluate actions methods and results	Demonstrates comprehensive ability to evaluate actions methods and results
Assess various social engineering and DoS/DDoS attack techniques.	Demonstrates adequate ability to evaluate actions methods and results	Demonstrates sound ability to evaluate actions methods and results	Demonstrates comprehensive ability to

			evaluate actions methods and results

Grade descriptors for Information Systems Analysis

Learning Outcome	Pass	Merit	Distinction
Understand soft and hard approaches to the analysis of information systems	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.
Understand the techniques associated with requirements capture	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand the different viewpoints associated with IS methodologies	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.
Be able to apply various analytical techniques for understanding a complex organisational environment	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand the relationship between the economic, social, political and technical factors influencing a business problem	Provides consistent interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides consistently critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.
Understand and apply the principles of interface design and the requirements and characteristics of users that motivate these	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.

Grade descriptors for Information Systems and Organisations

Learning Outcome	Pass	Merit	Distinction
Analyse the use of Information Systems (IS) within organisations	Can adequately determine, adapt and use appropriate methods to reach appropriate solutions	Can soundly determine, adapt and use appropriate methods to reach established and appropriate solutions	Can coherently determine, adapt and use appropriate methods to reach well established and highly appropriate solutions
Examine the many internal and external uses of an organisation's IS	Provide consistent interpretation and evaluation of relevant information, concepts and ideas to address problems that are broadly defined yet complex.	Provide critical interpretation and evaluation of relevant information, concepts and ideas to address problems that are broadly defined yet complex.	Provide consistently critical interpretation and evaluation of relevant information, concepts and ideas to address problems that are broadly defined yet complex.
Critically evaluate the costs and benefits of a range of IS systems	Demonstrates adequate ability to evaluate actions methods and results	Demonstrates sound ability to evaluate actions methods and results	Demonstrates comprehensive ability to evaluate actions methods and results
Critically evaluate the cultural, structural and political aspects of IS	Provide consistent interpretation and evaluation of relevant information, concepts and ideas to address problems that are broadly defined yet complex.	Provide critical interpretation and evaluation of relevant information, concepts and ideas to address problems that are broadly defined yet complex.	Provide consistently critical interpretation and evaluation of relevant information, concepts and ideas to address problems that are broadly defined yet complex.
Examine the issues associated with human interaction with IS	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them

Assess the effects of technological change on IS and the organisations	Use appropriate research to inform actions/ conclusions	Use detailed research to inform actions/ conclusions	Use thorough and detailed research to inform well supported actions/ conclusions

Grade descriptors for Network Security Threats and Defence Mechanisms

Learning Outcomes	**Pass**	**Merit**	**Distinction**
Understand fundamental networking concepts, analyse protocols and implement established standards.	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Be able to assess potential vulnerabilities and threats to a network's infrastructure.	Demonstrates adequate ability to evaluate actions methods and results	Demonstrates sound ability to evaluate actions methods and results	Demonstrates comprehensive ability to evaluate actions methods and results
Understand the working of encryption, protocols and policies.	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Identify and analyse the issues with physical security, operating systems and Network-based applications.	Use appropriate research to inform actions/ conclusions	Use detailed research to inform actions/ conclusions	Use thorough and detailed research to inform well supported actions/ conclusions
Understand the fundamental concept of a Firewall	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Understand the role and workings of IDS/IPS in network defence.	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them

Understand the purpose of Virtual Private Networks	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them

Grade descriptors for Network Security and Cryptography

Learning Outcome	**Pass**	**Merit**	**Distinction**
Understand the most common types of cryptographic algorithm	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand the Public-key Infrastructure	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.
Understand security protocols for protecting data on networks	Demonstrates adequate ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates sound ability to review the effectiveness and appropriateness of actions methods and results.	Demonstrates comprehensive ability to review the effectiveness and appropriateness of actions methods and results.
Be able to digitally sign emails and files	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand Vulnerability Assessments and the weakness of using passwords for authentication	Provides consistent interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides consistently critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.

Be able to perform simple vulnerability assessments and password audits	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Be able to configure simple firewall architectures	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand Virtual Private Networks	Has adequate awareness of different perspectives or approaches within the area of study	Has sound, informed awareness of different perspectives or approaches within the area of study	Has comprehensive, well-informed awareness of different perspectives or approaches within the area of study
Be able to deploy wireless security	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.

Grade descriptors Professional Issues in IT

Learning Outcome	**Pass**	**Merit**	**Distinction**
Understand the social, ethical and professional issues essential to the IT profession	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand a project management life cycle and associated techniques	Can adequately Identify, adapt and use appropriate skills, methods and procedures to reach appropriate solutions.	Can soundly identify, adapt and use appropriate skills, methods and procedures to reach supported and appropriate solutions.	Can coherently identify, adapt and use appropriate skills, methods and procedures to reach well supported and highly appropriate solutions.
Understand how to deploy a software application	Demonstrates adequate ability to review the effectiveness and	Demonstrates sound ability to review the effectiveness and appropriateness of	Demonstrates comprehensive ability to review the effectiveness and appropriateness of

	appropriateness of actions methods and results.	actions methods and results.	actions methods and results.
Understand risks and the management of them in software projects	Has adequate awareness of different perspectives or approaches within the area of study	Has sound, informed awareness of different perspectives or approaches within the area of study	Has comprehensive, well-informed awareness of different perspectives or approaches within the area of study
Understand the principles and techniques of IT service management	Provides consistent interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides consistently critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.
Be able to design software quality policies and procedures	Provides consistent interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.	Provides consistently critical interpretation and evaluation of relevant information and ideas to address problems that are well defined but non-routine.

Grade descriptors for Principles of Business Operations

Learning Outcome	**Pass**	**Merit**	**Distinction**
Examine the frameworks of operations management	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Analyse the use of technology in operations management	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Assess the design of goods and services	Provide consistent interpretation and evaluation of relevant information, concepts and ideas to address problems	Provide critical interpretation and evaluation of relevant information, concepts and ideas to address problems	Provide consistently critical interpretation and evaluation of relevant information, concepts and ideas to address problems

	that are broadly defined yet complex.	that are broadly defined yet complex.	that are broadly defined yet complex.
Analyse how operations management processes are developed	Demonstrates adequate understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates sound understanding of different perspectives, approaches or school of thought and the reasoning behind them	Demonstrates comprehensive understanding of different perspectives, approaches or school of thought and the reasoning behind them
Evaluate the use of lean operations	Provide consistent interpretation and evaluation of relevant information, concepts and ideas to address problems that are broadly defined yet complex.	Provide critical interpretation and evaluation of relevant information, concepts and ideas to address problems that are broadly defined yet complex.	Provide consistently critical interpretation and evaluation of relevant information, concepts and ideas to address problems that are broadly defined yet complex.