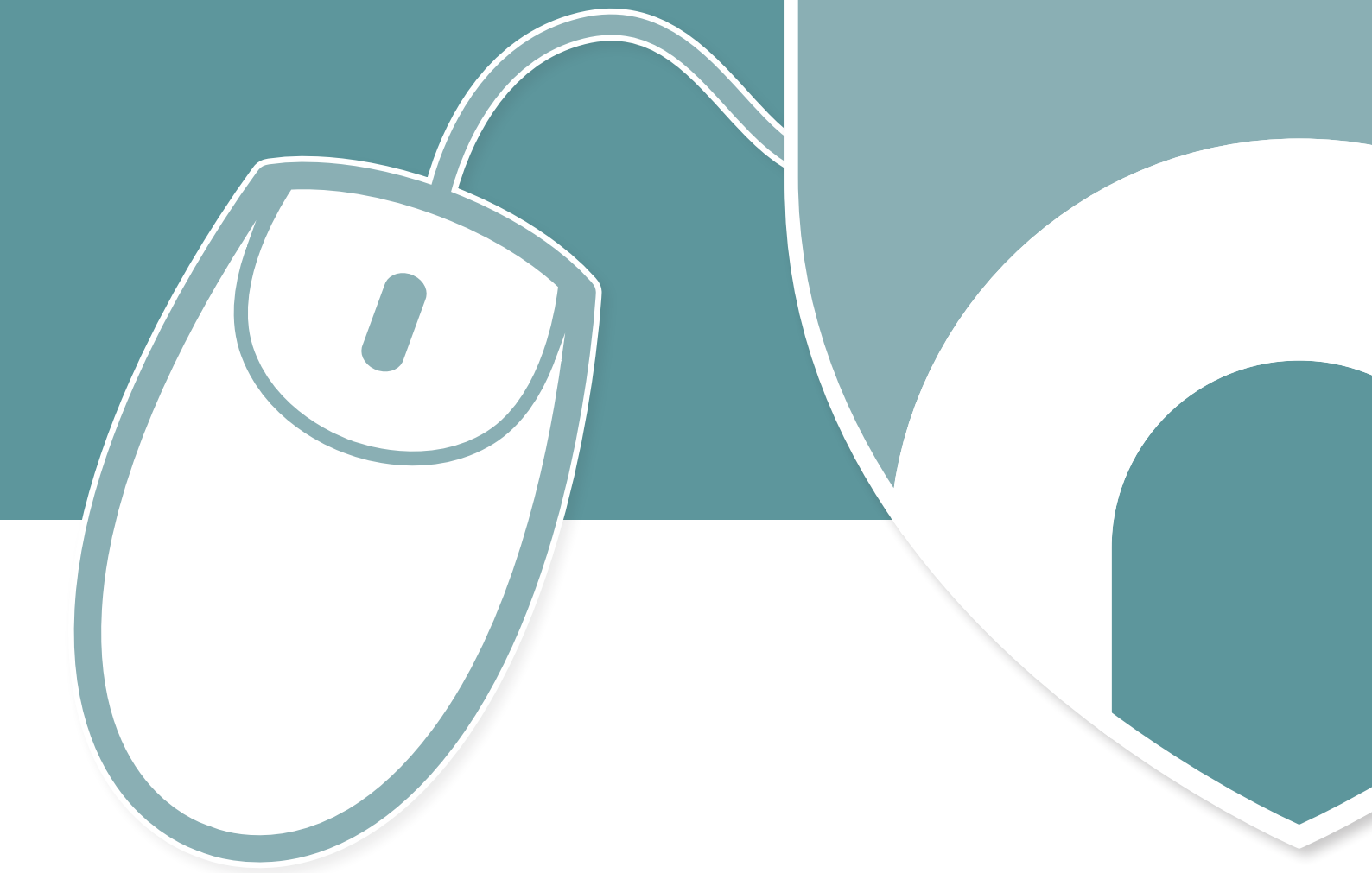
Awarding Great British Qualifications

Level 5 Diploma in Computing (L5DC)
Qualification Unit Specification
2017/18



Modification History

Version	Revision Description
V1.0	For release
V1.1	Version for academic year 2014/15
V1.2	Version for academic year 2015/16
V1.3	Version for academic year 2015/16 (Updated for Revised IT Assessment Strategy)
V1.4	Minor addition to wording for *Section 3*
V1.5	Addition of Total Qualification Time information
V1.6	Updated qualifications framework information
V1.7	Added the TQT and GLH figures

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1. About NCC Education

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

With Centres in over 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 and Northern Ireland.

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:

  http://ofqual.gov.uk/qualifications-and-assessments/qualification-frameworks/

- **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.

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 Title, Credits, Units and Level

NCC Education Level 5 Diploma in Computing (RQF), 120 credits, all at RQF Level 5.

Total Qualification Time: 1,200 hours.

Guided Learning Hours: 444 hours.

Candidates must pass all 8 Units to be awarded the Level 5 Diploma in Computing certificate.

Professional Issues in IT (15 credits)	Network Security and Cryptography (15 credits)	Information Systems Analysis (15 credits)	Dynamic Websites (15 credits)
Analysis, Design and Implementation (15 credits)	Database Design and Development (15 credits)	Agile Development (15 credits)	Computing Project (15 credits)

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

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	**Local Examination**	**Global Assignment**
Professional Issues in IT	100%	-	-
Network Security and Cryptography	50%		50%
Information Systems Analysis	100%	-	-
Dynamic Websites	-	-	100%
Analysis, Design and Implementation	-	50%	50%
Database Design and Development	-	50%	50%
Agile Development	-	-	100%
Computing Project	-	-	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. Local Examinations and Global Assignments are marked by the Centre and Global Examinations 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 *Connect*, 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 *Examination Guidelines* and *Marking and Moderation Manual*. The *Marking and Moderation Manual* also includes full reminder checklists for Centre administrators.

4 Administration

4.1 Assessment Cycles

Four assessment cycles are offered throughout the year, in March, June, September and December.

Examination dates and assignment submission deadlines are published in the NCC Education *Activity Schedule*, which is provided to Centres by Customer Services. It is also available on *Connect,* 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 International Diploma in Computer Studies (IDCS) • Holders of the NCC Education Level 4 Diploma in Computing (L4DC) (RQF) • 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. It is recommended that IDCS-holders wishing to progress to the Level 5 Diploma in Computing should have either passed the Java or Visual Basic elective Unit, or should have some object-oriented programming experience or training before proceeding with the Level 5 qualification. **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 *Connect* 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 June, Units C and D in September, Units E and F in December and Units G and H in March). This includes candidates who need to resit a particular Unit.

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

4.6 Resits

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

Candidates may only seek reassessment in a previously failed Unit.

5. Syllabus

5.1. Professional Issues in IT

Title:	Professional Issues in IT

RQF code:	R/503/4768	**Credits**	15	**Level**	5

Guided Learning Hours	60	**Total Qualification Time**	150

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**
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***
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***
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***
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***
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***
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***

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***
Applying, Evaluating and Managing Risk Analysis	• Applying risk analysis and risk management to an IT project • Evaluating findings • Reporting results ***Learning Outcome: 4***
IT Service Management (ITSM)	• What is IT service management? • Where is ITSM focused? • Why is ITSM important? • ITSM International Standards ***Learning Outcome: 5***
Analysing and Applying IT Service Management	• Analysing and applying IT service management • Evaluation of ITSM – advantages and disadvantages ***Learning Outcome: 5***
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***
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: 6.1 ICT Professionals **Related NOS:** 4.7.P.3 – Monitor the progress of system/solution/service design activities; 5.1.S.4 - Monitor, analyse and report on systems development activities; 5.2.P.1 - Plan software development activities; 5.2.P.3 - Control software development activities; 5.2.P.4 - Contribute to the management of software development; 5.3.P.2 - Contribute to the communication of the results of IT/Technology solution testing; 5.3.S.2 - Manage testing activities

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

5.2. Network Security and Cryptography

Title:	Network Security and Cryptography

RQF code:	R/503/4785	**Credits**	15	**Level**	5

Guided Learning Hours	60	**Total Qualification Time**	150

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

VPN	• Virtual Private Network technologies and issues ***Learning Outcomes: 7 & 8***
Remote Access	• Alternative remote access technologies: – Remote desktops – Web applications ***Learning Outcomes: 7 & 8***
Wireless Security	• Wireless security (WEP, WPA, WPA2) • Secure network architectures for wireless deployments ***Learning Outcomes: 9***

Related National Occupational Standards (NOS)
Sector Subject Area: 6.1 ICT Professionals **Related NOS:** 6.2.A.1 - Contribute to IT/technology security management activities; 6.2.A.2 - Document IT/technology security management processes; 6.2.A.3 - Assist the management with IT/technology security systems; 6.2.P.1 - Manage the IT/technology security requirements; 6.2.P.2 - Carry out IT/technology security management activities

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

5.3. Information Systems Analysis

Title:	Information Systems Analysis

RQF code:	Y/503/4769	**Credits**	15	**Level**	5

Guided Learning Hours	60	**Total Qualification Time**	150

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**
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**
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**
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**

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***
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***

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***
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***

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***
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***
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***

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***
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: 6.1 ICT Professional Competence **Related NOS:** 4.1.P.1 – Carry out IT/technology architecture activities 4.1.P.2.C – Contribute to information activities relating to IT/technology architecture models 4.1.P.1 – Contribute, under supervision, to the preparation of a data analysis assignment; 4.1.P.2 – Assist in the development of data analysis models 6.1.A.1 - Contribute to information management 6.1.A.2 - Document information assets 6.1.P.1 - Manage the classification and categorisation of information

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

5.4. Analysis, Design and Implementation

Title:	Analysis, Design and Implementation

RQF code:	H/503/4869	**Credits**	15	**Level**	5

Guided Learning Hours	60	**Total Qualification Time**	150

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 Indentify and describe OO design models
2. Understand how to convert OO analysis and design models to code	2.1 Convert OO analysis models to code 2.2 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
7. Be able to refactor an OO programme to improve quality	7.1 Refactor code based on standard refactoring techniques.

Syllabus content	
Topic	***Course coverage***
Introduction to the Unit	• Introduction to the Unit • Distinction between analysis and design • The Software Crisis • Recap of key OO concepts ***Learning Outcomes: 1***

Introduction to StarUML	• Obtaining and using the Unit OO Case tool • Turning simple models into code ***Learning Outcomes: 5 & 6***
Object-Oriented Modelling	• Discussion of the OO software development process • Use-case diagrams • Identifying abstractions • Event Decomposition • Discussion of benefits of OOAD • Discussion of drawbacks of OOAD ***Learning Outcomes: 1 & 5***
Static Modelling in UML	• Requirements gathering • Natural Language Analysis • Candidate classes • Class diagrams • Converting class diagrams into code ***Learning Outcomes: 1 & 5***
Dynamic Analysis and Design	• Activity diagrams • Sequence diagrams • Converting dynamic models into code ***Learning Outcomes: 1 & 5***
OOAD Case Study	• Worked example from problem statement to design ***Learning Outcomes: 1, 3 & 5***
Design Patterns 1	• Introduction to design patterns • Factory • Abstract Factory ***Learning Outcomes: 2, 3 & 4***
Design Patterns 2	• Model-View-Controller • Flyweight • Strategy • Facade ***Learning Outcomes: 2, 3 & 4***
Elements of Good Design	• Software quality attributes • Software component design • Coupling • Cohesion • The Observer design pattern ***Learning Outcomes: 3 & 5***

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***
Maintenance and Refactoring	• Impact of change • Refactoring • Refactoring case study ***Learning Outcomes: 4 & 7***
Recap	• Recap of Unit ***Learning Outcomes: All***

Related National Occupational Standards (NOS)
Sector Subject Area: 6.1 ICT Professionals **Related NOS:** 4.3.P.1 – Manage, under supervision, information to direct human needs analysis assignments; 4.3.P.2 – Produce, implement and maintain quality human needs analysis activities; 4.3.P.3 – Provide human needs analysis findings to others; 4.4.P.1 – Prepare, under supervision, for a systems analysis assignment; 4.4.P.2 – Carry out, as required, systems analysis activities; 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; 4.7.P.1 – Prepare, under supervision, for system/solution/service design activities; 4.7.P.2 – Assist with the design of system/solution/service design; 4.7.P.3 – Monitor the progress of system/solution/service design activities; 5.1.S.2 - Initiate systems development activities; 5.3.S.3 - Manage systems development activities; 5.2.P.2 - Perform software development activities; 5.3.P.2 - Contribute to the communication of the results of IT/Technology solution testing; 5.3.S.1 - Implement the infrastructure for testing activities; 5.3.S.2 - Manage testing activities; 5.3.S.3 - Monitor and control testing activities.

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

5.5. Dynamic Websites

Title:	Dynamic Websites

RQF code:	Y/503/4786	**Credits**	15	**Level**	5

Guided Learning Hours	60	**Total Qualification Time**	150

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**
Introduction to the Unit	• Introduction to the Unit • N-Tier Architectures • Introduction to layers and the tools used ***Learning Outcomes: 1, 3, & 4***
Introduction to PHP	• Programming with PHP • Language design • Loops, Selections and Iterations • Version considerations • HTML via PHP ***Learning Outcomes: 1 & 2***
Cookies and Sessions	• Statelessness in HTTP • Cookies • Sessions • The role of PHP in web-based applications ***Learning Outcomes: 1 & 2***
MySQL and PHP	• Creating tables via PHP • Manipulating tables via PHP • Querying database tables via PHP ***Learning Outcomes: 2***
Web Based Protocols	• XML • RSS • XHTML • CSS ***Learning Outcomes: 1 & 3***
Ajax (1)	• Introduction to dynamic client side scripting with Java-script • Building a web-based user interface • JavaScript events • Asynchronous Applications ***Learning Outcomes: 1 & 2***
Ajax (2)	• Manipulating the Document Object Model • XML DOM trees • Ajax requests and responses • jQuery ***Learning Outcomes: 1 & 2***

Evaluation	• Standards validation • User centred design • Accessibility • Browser compatibility ***Learning Outcomes: 2 & 4***
Web Services	• SOAP • REST • Google Directions • Mash-Ups ***Learning Outcomes: 4 & 5***
jQuery	• Overview of jQuery • Presentational Flourishes • Selectors • Filters • Callbacks ***Learning Outcomes: 1, 2 & 3***
jQuery and Ajax	• jQuery and Ajax • jQuery plug-ins • jQuery widgets • Themeroller ***Learning Outcomes: 1, 2 & 3***
Integration	• Integration of topics • Development of solution to meet a specified objective ***Learning Outcomes: 3 & 5***

Related National Occupational Standards (NOS)
Sector Subject Area: 6.1 ICT Professionals **Related NOS:** 4.7.P.1 – Prepare, under supervision, for system/solution/service design activities; 4.7.P.2 – Assist with the design of system/solution/service design; 4.7.P.3 – Monitor the progress of system/solution/service design activities; 5.1.S.2 - Initiate systems development activities; 5.3.S.3 - Manage systems development activities; 5.2.P.2 - Perform software development activities

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

5.6. Database Design and Development

Title:	Database Design and Development

RQF code:	D/503/4787	**Credits**	15	**Level**	5

Guided Learning Hours	60	**Total Qualification Time**	150

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***
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***
Enhancing Design 1	• Introduction to normalisation • The concept of functional dependency • Data redundancy and update anomalies • Overcoming anomalies with normalisation ***Learning Outcome: 2***
Enhancing Design 2	• Deriving a set of relations from a conceptual data model • Validating relations using normalisation • Integrity constraints on tables ***Learning Outcome: 3***
Data Retrieval 1	• Table and view structure in a relational database • Data types • Null values • Retrieving data using SQL ***Learning Outcome: 2***
Data Retrieval 2	• Referential integrity in relational databases • Types of joins • Retrieving data using joins • Retrieving data using sub-queries ***Learning Outcome: 5***
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***
Physical Design 2	• The concept of derived data • Designing a representation of derived data ***Learning Outcome: 4***
Physical Design 3	• Types of constraints • Designing integrity constraints for the target DBMS ***Learning Outcomes: 3, 4 & 5***

Physical Design 4	• Understanding transactions • Denormalisation • Improving performance • Estimating the size of the database ***Learning Outcome: 4***
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***
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***
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: 6.1 ICT Professionals **Related NOS:** 4.1.P.1 – Contribute, under supervision, to the preparation of a data analysis assignment; 4.1.P.2 – Assist in the development of data analysis models; 4.1.P.3 – Manage the outcomes from the data analysis assignment; 4.5.P.2 – Manage, under supervision, the maintenance of data design assignments; 4.5.P.1 – Provide others, when requested, with specified information relating to data design activities; 4.5.S.1 – Select and implement appropriate data design processes; 4.5.S.2 – Manage the progress of data design assignments; 4.5.S.3 – Review the effectiveness of data design deliverables.

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

5.7. Agile Development

Title:	Agile Development

RQF code:	J/503/4783	**Credits**	15	**Level**	5

Guided Learning Hours	60	**Total Qualification Time**	150

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***
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***
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***
Modelling	• What is a model? • Links to the 8 principles • Viewpoints for modelling • Modelling within the Agile lifecycle ***Learning Outcomes: 3 & 6***
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***
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***
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***

Project Management Considerations Part 2: Quality and Testing	• Configuration Management • Quality and Maintainability • Testing concepts • Metrics ***Learning Outcomes: 1, 2 & 6***
Facilitated Workshops	• What is a Facilitated workshop? • The role of the Facilitator; co-facilitator/scribe; participants. • Workshop planning • Workshop success factors ***Learning Outcome: 6***
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***
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***
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***

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

5.8. Computing Project

Title:	Computing Project

RQF code:	L/503/4784	**Credits**	15	**Level**	5

Guided Learning Hours	24	**Total Qualification Time**	150

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***
Introduction	• Appropriate Artefacts • Planning your Project • Appropriate Development Methods • Appropriate Risk Management • Appropriate Configuration Management ***Learning Outcome: 2***
Analysis Specifications	• Structure of an Analysis Specification • Content of an Analysis Specification ***Learning Outcome: 3***
Design Specifications	• Structure of a Design Specification • Content of a Design Specification ***Learning Outcomes: 4 & 5***
Test Scripts	• Types of Testing (Reminder) • Choosing Appropriate Tests • Applying Tests • Documenting Tests ***Learning Outcome: 6***
Planning the final report	• Structure of Final Report • Content of Final Report • Citations and Referencing (Reminder) • Appropriate Appendices ***Learning Outcomes: 1, 2 & 3***
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: 6.1 ICT Professionals **Related NOS:** 4.1.P.3 – Manage the outcomes from the data analysis assignment; 4.2.S.1 – Prepare for data analysis activities; 4.2.S.2 – Manage effective data analysis activities; 4.2.S.3 – Maintain effective data analysis deliverables; 4.3.P.1 – Manage, under supervision, information to direct human needs analysis assignments; 4.3.P.2 – Produce, implement and maintain, quality human needs analysis activities; 4.3.P.3 – Provide human needs analysis findings to others; 4.4.P.1 – Prepare, under supervision, for a systems analysis assignment; 4.4.P.2 – Carry out, as required, systems analysis activities; 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; 4.5.P.1 – Assist with the development for data design activities; 4.5.P.2 – Manage, under supervision, the maintenance of data design assignments; 4.5.P.1 – Provide others, when requested, with specified information relating to data design activities; 4.5.S.1 – Select and implement appropriate data design processes; 4.6.P.1 – Prepare for human interaction and interface (HCI) design activities; 4.6.P.2 – Implement, under supervision, human interaction and interface (HCI) design activities; 4.6.P.3 – Manage the needs of different users of HCI design activities; 4.7.P.1 – Prepare, under supervision, for system/solution/service design activities; 4.7.P.2 – Assist with the design of system/solution/service design; 4.7.P.3 – Monitor the progress of system/solution/service design activities; 5.1.P.1 - Perform systems development activities; 5.1.P.2 - Contribute to the management of systems development; 5.3.S.3 - Manage systems development activities; 5.1.L.2 - Control systems development activities; 5.2.P.1 - Plan software development activities; 5.2.P.2 - Perform software development activities; 5.2.P.3 - Control software development activities; 5.2.P.4 - Contribute to the management of software development; 5.3.A.1 - Carry out IT/Technology solution testing activities under direction; 5.3.P.1 - Carry out IT/Technology solution testing; 5.3.P.2 - Contribute to the communication of the results of IT/Technology solution testing; 5.4.P.2 - Perform systems integration activities; 5.5.P.1 - Perform systems installation, implementation and handover activities; 5.5.P.2 - Document and present systems installation, implementation and handover 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.

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 are then dispatched to Centres.

7. Further Information

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

Appendix 1 Qualification Documentation

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

- Reasonable Adjustments and Special Considerations Policy
- Examination Guidelines
- Marking and Moderation Manual
- Activity Schedule
- Operations Manual

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 Professional Issues in IT

Learning Outcome	Pass	Merit	Distinction
Understand the social, ethical and professional issues essential to the IT profession	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand a project management life cycle and associated techniques	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand how to deploy a software application	Demonstrate adequate deployment of an application	Demonstrate sound and appropriate deployment of an application	Demonstrate highly effective deployment of an application
Understand risks and the management of them in software projects	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand the principles and techniques of IT service management	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Be able to design software quality policies and procedures	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard

Grade descriptors for Information Systems Analysis

Learning Outcome	Pass	Merit	Distinction
Understand soft and hard approaches to the analysis of information systems	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand the techniques associated with requirements capture	Demonstrate adequate understanding of techniques	Demonstrate robust understanding of techniques	Demonstrate highly comprehensive understanding of techniques
Understand the different viewpoints associated with IS methodologies	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding

Learning Outcome	Pass	Merit	Distinction
Be able to apply various analytical techniques for understanding a complex organisational environment	Demonstrate adequate and appropriate application of techniques	Demonstrate sound and consistently appropriate application of techniques	Demonstrate detailed and highly appropriate application of techniques
Understand the relationship between the economic, social, political and technical factors influencing a business problem	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand and apply the principles of interface design and the requirements and characteristics of users that motivate these	Demonstrate adequate and appropriate application of principles	Demonstrate sound and consistently appropriate application of principles	Demonstrate detailed and highly appropriate application of principles

Grade descriptors for Dynamic Websites

Learning Outcome	Pass	Merit	Distinction
Understand the various tools and techniques used for Web Application development	Demonstrate adequate understanding of tools and techniques	Demonstrate robust understanding of tools and techniques	Demonstrate highly comprehensive understanding of tools and techniques
Be able to develop data-driven websites	Show adequate development	Show sound and appropriate development	Show innovative and highly appropriate development
Be able to apply the various tools and techniques used to build data-driven websites	Demonstrate adequate and appropriate application of tools and techniques	Demonstrate sound and consistently appropriate application of tools and techniques	Demonstrate detailed and highly appropriate application of tools and techniques
Understand the functions of web services	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Be able to create and deploy web services	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard

Grade descriptors for Database Design and Development

Learning Outcome	Pass	Merit	Distinction
Understand the enterprise application of database systems	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand how to enhance the design of and further develop a database system	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Be able to enhance a logical database design	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Be able to develop a physical database design	Show adequate development	Show sound and appropriate development	Show innovative and highly appropriate development
Be able to enhance a database system using SQL	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard

Grade descriptors for Network Security and Cryptography

Learning Outcome	Pass	Merit	Distinction
Understand the most common types of cryptographic algorithm	Demonstrate adequate understanding of common types of cryptographic algorithm	Demonstrate robust understanding of common types of cryptographic algorithm	Demonstrate highly comprehensive understanding of common types of cryptographic algorithm
Understand the Public-key Infrastructure	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand security protocols for protecting data on networks	Demonstrate adequate understanding of security protocols	Demonstrate robust understanding of security protocols	Demonstrate highly comprehensive understanding of security protocols
Be able to digitally sign emails and files	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Understand Vulnerability Assessments and the weakness of using passwords for authentication	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Be able to perform simple vulnerability assessments and password audits	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard

Learning Outcome	Pass	Merit	Distinction
Be able to configure simple firewall architectures	Demonstrate adequate level of understanding and ability	Demonstrate robust level of understanding and ability	Demonstrate highly comprehensive level of understanding and ability
Understand Virtual Private Networks	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Be able to deploy wireless security	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard

Grade descriptors for Analysis, Design and Implementation

Learning Outcome	Pass	Merit	Distinction
Understand the seamless transition from OO Analysis to OO Design.	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand how to convert OO analysis and design models to code	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Understand the quality attributes associated with an OO development	Demonstrate adequate understanding of quality attributes	Demonstrate robust understanding of quality attributes	Demonstrate highly comprehensive understanding of quality attributes
Understand the concept of maintenance within an OO development environment	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Be able to produce OO analysis and design models using a case tool	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Be able to convert OO analysis and design models to code using an appropriate IDE	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Be able to refactor an OO programme to improve quality	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard

Grade descriptors for Agile Development

Learning Outcome	Pass	Merit	Distinction
Understand the background to Agile development	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand the roles within an Agile development team	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand the various Agile development techniques	Demonstrate adequate understanding of techniques	Demonstrate robust understanding of techniques	Demonstrate highly comprehensive understanding of techniques
Understand an Agile development lifecycle	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Understand the principles associated with an Agile development approach	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
Be able to apply an Agile development approach to a particular project scenario	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard

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