Pearson BTEC Level 5 Certificate in Professional Software Development (QCF)

Pearson BTEC Level 5 Diploma in Professional Software Development (QCF)

Pearson BTEC Level 5 Extended Diploma in Professional Software Development (QCF)

Specification

BTEC Professional qualifications

First teaching September 2014

Edexcel, BTEC and LCCI qualifications

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All information in this specification is correct at time of publication.

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Purpose of this specification

The purpose of a specification as defined by Ofqual is to set out:

- the qualification's objective
- any other qualification that a learner must have completed before taking the qualification
- any prior knowledge, skills or understanding that the learner is required to have before taking the qualification
- units that a learner must have completed before the qualification will be awarded and any optional routes
- any other requirements that a learner must have satisfied before they will be assessed or before the qualification will be awarded
- the knowledge, skills and understanding that will be assessed as part of the qualification (giving a clear indication of their coverage and depth)
- the method of any assessment and any associated requirements relating to it
- the criteria against which the learner's level of attainment will be measured (such as assessment criteria)
- any specimen materials
- any specified levels of attainment.

BTEC Professional qualification titles covered by this specification

Pearson BTEC Level 5 Certificate in Professional Software Development

Pearson BTEC Level 5 Diploma in Professional Software Development

Pearson BTEC Level 5 Extended Diploma in Professional Software Development

These qualification(s) have been accredited to the Qualifications and Credit Framework (QCF) and are eligible for public funding as determined by the Department for Education (DfE) under Section 96 of the Learning and Skills Act 2000.

The qualification titles listed above feature in the funding lists published annually by the DfE and the regularly updated website www.education.gov.uk/. The QCF Qualification Number (QN) should be used by centres when they wish to seek public funding for their learners. Each unit within a qualification will also have a QCF unit code.

The QCF qualification and unit codes will appear on learners' final certification documentation.

The QN(s) for the qualification(s) in this publication are:

Pearson BTEC Level 5 Certificate in Professional Software Development (QCF)	601/3336/3
Pearson BTEC Level 5 Diploma in Professional Software Development (QCF)	601/3337/5
Pearson BTEC Level 5 Extended Diploma in Professional Software Development (QCF)	601/3385/5

These qualification titles will appear on learners' certificates. Learners need to be made aware of this when they are recruited by the centre and registered with Pearson.

Contents

What are BTEC Level 5 Professional qualifications?

BTEC Professional qualifications are qualifications at Level 4 to Level 8 in the Qualifications and Credit Framework (QCF) and are designed to provide professional work-related qualifications in a range of sectors. They give learners the knowledge, understanding and skills that they need to prepare for employment. The qualifications also provide career development opportunities for those already in work. Consequently they provide a course of study for full-time or part-time learners in schools, colleges and training centres.

BTEC Professional qualifications provide much of the underpinning knowledge and understanding for the National Occupational Standards for the sector, where these are appropriate. A number of BTEC Professional qualifications are recognised as the knowledge components of Apprenticeships Frameworks.

On successful completion of a BTEC Professional qualification, learners can progress to or within employment and/or continue their study in the same or related vocational area.

The QCF is a framework which awards credit for qualifications and units and aims to present qualifications in a way that is easy to understand and measure. It enables learners to gain qualifications at their own pace along flexible routes.

Every unit and qualification in the framework will have a credit value.

The credit value of a unit specifies the number of credits that will be awarded to a learner who has achieved the learning outcomes of the unit.

The credit value of a unit is based on:

- one credit for those learning outcomes achievable in 10 hours of learning
- learning time – defined as the time taken by learners at the level of the unit, on average, to complete the learning outcomes of the unit to the standard determined by the assessment criteria.

The credit value of the unit will remain constant in all contexts, regardless of the assessment method used for the qualification(s) to which it contributes.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Rationale

Within the Level 5 Professional Software Development suite there are three qualifications:

- Certificate 30 credits (120 Guided Learning Hours [GLH])
- Diploma 75 credits (300 GLH)
- Extended Diploma 150 credits (600 GLH)

BTEC Level 5 Certificate

The BTEC Level 5 Certificate offers an engaging programme for those who are clear about the vocational area they want to learn more about. In particular, it provides employed learners an opportunity to develop or improve their skills, knowledge and understanding of Information Technology (IT). For example, an IT professional experienced at maintaining and developing Cobol software applications may want to develop new skills to program mobile devices.

BTEC Level 5 Diploma

The BTEC Level 5 Diploma has been designed for learners wishing to change career or move into the Information Technology sector, perhaps following a career break, and it extends the work-related focus from the BTEC Level 5 Certificate. These learners may well be Science, Technology, Engineering and Mathematics (STEM) graduates, who have not studied IT in any depth and want to change career. The range and nature of units available would allow learners to develop vocational skills that are sought after by the IT sector.

BTEC Level 5 Extended Diploma

The BTEC Level 5 Diploma has been designed for learners wishing to change career or move into the Information Technology sector from a broad range of backgrounds. Again, it extends the work-related focus from the BTEC Level 5 Diploma. The Extended Diploma allows learners from a broad range of backgrounds, for example English or Sports Science, to develop a range of skills which can be used in employment or for further study.

Key features of the Pearson BTEC Level 5 in Professional Software Development (QCF) qualifications

The Pearson BTEC Level 5 in Professional Software Development (QCF) qualifications have been developed to give learners the opportunity to:

- engage in learning that is relevant to them and which will provide opportunities to develop a range of skills and techniques, personal skills and attributes essential for successful performance in working life
- achieve a nationally recognised Level 4 to Level 8 vocationally-related qualification
- progress to employment in a particular vocational sector
- progress to related general and/or vocational qualifications.

Rules of combination

The rules of combination specify the credits that need to be achieved, through the completion of particular units, for the qualification to be awarded. All accredited qualifications within the QCF have rules of combination.

Rules of combination for BTEC Level 5 qualifications

When combining units for a Pearson BTEC Level 5 in Professional Software Development (QCF) qualification it is the centre's responsibility to ensure that the following rules of combination are adhered to.

Pearson BTEC Level 5 Certificate in Professional Software Development (QCF)

1 Qualification credit value: a minimum of 30 credits.

2 Minimum credit to be achieved at, or above, the level of the qualification: 30 credits.

3 All credits must be achieved from the units listed in this specification.

Pearson BTEC Level 5 Diploma in Professional Software Development (QCF)

1 Qualification credit value: a minimum of 75 credits.

2 Minimum credit to be achieved at, or above, the level of the qualification: 45 credits.

3 A maximum of 15 credits can be imported from the Pearson BTEC Higher National Certificate/Diploma in Computing and Systems Development (QCF) to meet local needs. Level rules and mandatory core units must not be changed and Level 3 units cannot be imported. Also, centres must gain approval from Pearson prior to importing units.

Pearson BTEC Level 5 Extended Diploma in Professional Software Development (QCF)

1 Qualification credit value: a minimum of 150 credits.

2 Minimum credit to be achieved at, or above, the level of the qualification: 80 credits.

3 A maximum of 30 credits can be imported from the Pearson BTEC Higher National Certificate/Diploma in Computing and Systems Development (QCF) to meet local needs. Level rules and mandatory core units must not be changed and Level 3 units cannot be imported. Also, centres must gain approval from Pearson prior to importing units.

Pearson BTEC Level 5 Certificate Professional Software Development (QCF)

The Pearson BTEC Level 5 Certificate in Professional Software Development (QCF) is a 30-credit and 120-guided-learning-hour (GLH) qualification that consists of one mandatory unit **plus** an optional unit(s).

Pearson BTEC Level 5 Diploma in Professional Software Development (QCF)			
Unit	**Mandatory unit**	**Credit**	**Level**
1	Systems Analysis and Design	15	5
Unit	**Optional units**		
8	Database Management Systems	15	5
9	Software Testing	15	5
11	Object Orientated Programming	15	5
13	Programming in C++	20	5
14	Developing Software Applications using C#	20	5
15	Commercial Software Testing	20	5
16	Cloud Computing	15	5
17	Web Services Development	15	5
18	Job Control Language (JCL)	15	5
19	Mobile App Development (Android)	15	5
20	Mobile App Development (iOS)	15	5

Pearson BTEC Level 5 Diploma Professional Software Development (QCF)

The Pearson BTEC Level 5 Diploma in Professional Software Development (QCF) is a 75-credit and 300-guided-learning-hour (GLH) qualification that consists of two mandatory units **plus** optional units. At least 45 credits must be at Level 5 or above and following approval from Pearson a maximum of 15 credits may be imported under meeting local needs.

Pearson BTEC Level 5 Diploma in Professional Software Development (QCF)			
Unit	**Mandatory units**	**Credit**	**Level**
1	Systems Analysis and Design	15	5
2	Introduction to Programming	15	4
Unit	**Optional units**		
3	Personal and Professional Development	15	5
4	Systems Architecture	15	4
5	Professional Practice in an IT Context	5	3
6	Web Application using ASP.Net	10	4
7	Software Project	5	4
8	Database Management Systems	15	5
9	Software Testing	15	5
10	Event Driven Programming	5	4
11	Object Orientated Programming	15	5
12	Mainframe Programming in Cobol	15	4
13	Programming in C++	20	5
14	Developing Software Applications using C#	20	5
15	Commercial Software Testing	20	5
16	Cloud Computing	15	5
17	Web Services Development	15	5
18	Job Control Language (JCL)	15	5
19	Mobile App Development (Android)	15	5
20	Mobile App Development (iOS)	15	5

Pearson BTEC Level 5 Extended Diploma in Professional Software Development (QCF)

The Pearson BTEC Level 5 Extended Diploma in Professional Software Development (QCF) is a 150-credit and 600-guided-learning-hour (GLH) qualification that consists of four mandatory units **plus** optional units. At least 80 credits must be at Level 5 or above and following approval from Pearson a maximum of 15 credits may be imported under meeting local needs.

Pearson BTEC Level 5 Diploma in Professional Software Development			
Unit	**Mandatory units**	**Credit**	**Level**
1	Systems Analysis and Design	15	5
2	Introduction to Programming	15	4
3	Personal and Professional Development	15	5
11	Object Orientated Programming	15	5
Unit	**Optional units**		
4	Systems Architecture	15	4
5	Professional Practice in an IT Context	5	3
6	Web Application using ASP.Net	10	4
7	Software Project	5	4
8	Database Management Systems	15	5
9	Software Testing	15	5
10	Event Driven Programming	5	4
12	Mainframe Programming in Cobol	15	4
13	Programming in C++	20	5
14	Developing Software Applications using C#	20	5
15	Commercial Software Testing	20	5
16	Cloud Computing	15	5
17	Web Services Development	15	5
18	Job Control Language (JCL)	15	5
19	Mobile App Development (Android)	15	5
20	Mobile App Development (iOS)	15	5

All units within these qualifications are internally assessed. The qualifications are criterion referenced, based on the achievement of all the specified learning outcomes.

To achieve a 'pass' a learner must have successfully passed **all** the assessment criteria.

Assessment

All units within these qualifications are internally assessed. The qualifications are criterion referenced, based on the achievement of all the specified learning outcomes.

Guidance

The purpose of assessment is to ensure that effective learning has taken place to give learners the opportunity to:

- meet the standard determined by the assessment criteria and
- achieve the learning outcomes.

All the assignments created by centres should be reliable and fit for purpose, and should be built on the unit assessment criteria. Assessment tasks and activities should enable learners to produce **valid, sufficient and reliable evidence** that relates directly to the specified criteria. Centres should enable learners to produce evidence in a variety of different forms, including performance observation, presentations and posters, along with projects, or time-constrained assessments.

Centres are encouraged to emphasise the practical application of the assessment criteria, providing a realistic scenario for learners to adopt, and making maximum use of practical activities. The creation of assignments that are fit for purpose is vital to achievement and their importance cannot be over-emphasised.

The assessment criteria must be clearly indicated in the assignments briefs. This gives learners focus and helps with internal verification and standardisation processes. It will also help to ensure that learner feedback is specific to the assessment criteria.

When designing assignments briefs, centres are encouraged to identify common topics and themes. A central feature of vocational assessment is that it allows for assessment to be:

- current, i.e. to reflect the most recent developments and issues
- local, i.e. to reflect the employment context of the delivering centre
- flexible to reflect learner needs, i.e. at a time and in a way that matches the learner's requirements so that they can demonstrate achievement.

Qualification grade

The overall grade for each qualification is a '**pass'**. To obtain the 'pass' grade learners must achieve the minimum eligible credit value specified by the rule of combination for the qualification. Therefore, learners must have successfully passed **all** the relevant assessment criteria.

In these qualifications each unit has a credit value that will be awarded to a learner who has achieved the learning outcomes of the unit. For the combination of units to be eligible, the learner must achieve any specified mandatory units and a further number of specified credits from the optional units or through meeting local needs up to the required minimum total of credits for the qualification.

Quality assurance of centres

BTEC Level 4–7 qualifications provide a flexible structure for learners enabling programmes of varying credits and combining different levels. For the purposes of quality assurance, all individual qualifications and units are considered as a whole.

Centres delivering BTEC Level 4–7 qualifications must be committed to ensuring the quality of the units and qualifications they deliver, through effective standardisation of assessors and verification of assessor decisions. Centre quality assurance and assessment is monitored and guaranteed by Pearson.

Pearson quality assurance processes will involve:

- centre approval for those centres not already recognised as a centre for BTEC qualifications
- approval for BTEC Level 4-7 qualifications and units.

For all centres delivering BTEC qualifications at Levels 4–7, Pearson allocates a Standards Verifier (SV) for each sector offered who will conduct an annual visit to quality assure the programmes.

Approval

Centres are required to declare their commitment to ensuring the quality of the programme of learning and providing appropriate assessment opportunities for learners that lead to valid and accurate assessment outcomes. In addition, centres will commit to undertaking defined training and online standardisation activities.

Centres already holding approval are able to gain qualification approval online. New centres must complete a centre approval application.

Quality assurance guidance

Details of quality assurance for BTEC Level 4–7 qualifications are available on our website (www.edexcel.com).

Programme design and delivery

Mode of delivery

Centres are free to offer the qualifications using any mode of delivery (such as full-time, part-time, evening only, distance learning) that meets their learners' needs. Whichever mode of delivery is used, centres must ensure that learners have appropriate access to the resources identified in the specification and to the subject specialists delivering the units. This is particularly important for learners studying for the qualification through open or distance learning.

Learners studying for the qualification on a part-time basis bring with them a wealth of experience that should be utilised to maximum effect by tutors and assessors. The use of assessment evidence drawn from learners' work environments should be encouraged. Those planning the programme should aim to enhance the vocational nature of the qualification by:

- liaising with employers to ensure a course relevant to learners' specific needs
- accessing and using non-confidential data and documents from learners' workplaces
- including sponsoring employers in the delivery of the programme and, where appropriate, in the assessment
- linking with company-based/workplace training programmes
- making full use of the variety of experience of work and life that learners bring to the programme.

Resources

BTEC Level 5 qualifications are designed to give learners an understanding of the skills needed for specific vocational sectors. Physical resources need to support the delivery of the programme and the assessment of the learning outcomes, and should therefore be of industry standard. Staff delivering programmes and conducting the assessments should be familiar with current practice and standards in the sector concerned. Centres will need to meet any specific resource requirements to gain approval from Pearson. Within the staff team there needs to be the knowledge, experience and expertise to deliver the technical content. Staff need to have access to software programmes and technical material to deliver the professional qualification.

Delivery approach

It is important that centres develop an approach to teaching and learning that supports the vocational nature of BTEC Level 5 qualifications and the mode of delivery. Specifications give a balance of practical skill development and knowledge requirements, some of which can be theoretical in nature. Tutors and assessors need to ensure that appropriate links are made between theory and practical application and that the knowledge base is applied to the sector. This requires the development of relevant and up-to-date teaching materials that allow learners to apply their learning to actual events and activity within the sector. Maximum use should be made of learners' experience.

Meeting local needs

The qualifications set out in this specification have been developed in consultation with centres, employers and appropriate professional bodies.

The units in these qualifications are designed to meet the skill needs of the Information Technology Sector. To meet the needs of their learners, centres should make maximum use of the unit choice available to them and the local skills and training needs identified by organisations such as local councils, local enterprise partnerships and local funding agencies.

Centres may not always be able to meet local needs using the units in this specification. In this situation, they can seek **approval** from Pearson to use standard units from Pearson BTEC HNC in Computing and Systems Development (QCF) and Pearson BTEC HND in Computing and Systems Development (QCF). Centres need to justify the need for importing units.

The following maximum number of credits can be imported:

1.	30 credits Certificate (120 GLH)	=	0 credits (units cannot be imported)
2.	75 credits Diploma (300 GLH)	=	15 credits (one imported unit)
3.	150 credits Extended Diploma (600 GLH)	=	30 credits (one or two imported units).

Access and recruitment

Pearson's policy regarding access to its qualifications is that:

- they should be available to everyone who is capable of reaching the required standards
- they should be free from any barriers that restrict access and progression
- there should be equal opportunities for all wishing to access the qualifications.

Centres are required to recruit learners to BTEC qualifications with integrity. This will include ensuring that applicants have appropriate information and advice about the qualifications and that the qualification will meet their needs. Centres should take appropriate steps to assess each applicant's potential and make a professional judgement about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult our policy on learners with particular requirements.

Centres will need to review the entry profile of qualifications and/or experience held by applicants, considering whether this profile shows an ability to progress to a higher level qualification.

Access to qualifications for learners with disabilities or specific needs

Equality and fairness are central to our work. Pearson's Equality Policy requires all learners to have equal opportunity to access our qualifications and assessments. It also requires our qualifications to be awarded in a way that is fair to every learner.

We are committed to making sure that:

- learners with a protected characteristic (as defined by the Equality Act 2010) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to learners who do not share that characteristic
- all learners achieve the recognition they deserve from undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Learners taking a qualification may be assessed in British sign language or Irish sign language where it is permitted for the purpose of reasonable adjustments.

Further information on access arrangements can be found in the Joint Council for Qualifications (JCQ) document *Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational qualifications*.

Details on how to make adjustments for learners with protected characteristics are given in the document *Pearson Supplementary Guidance for Reasonable Adjustment and Special Consideration in Vocational Internally Assessed Units*.

Both documents are on our website at: www.edexcel.com/policies

Restrictions on learner entry

Pearson BTEC Level 5 in Professional Software Development are accredited on the QCF for learners aged 18 and above.

In particular sectors the restrictions on learner entry might also relate to any physical or legal barriers, for example people working in health, care or education are likely to be subject to Disclosure and Barring Service criminal record checks.

Recognising prior learning and achievement

Recognition of Prior Learning

Recognition of Prior Learning (RPL) is a method of assessment (leading to the award of credit) that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and so do not need to develop through a course of learning.

Pearson encourages centres to recognise learners' previous achievements and experiences whether at work, home and at leisure, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning.

RPL enables recognition of achievement from a range of activities using any valid assessment methodology. Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be sufficient, reliable and valid.

There is further guidance in our policy document *Recognition of Prior Learning Policy and Process,* available on our website at www.edexcel.com/policies

Credit transfer

Credit transfer describes the process of using a credit or credits awarded in the context of a different qualification or awarded by a different awarding organisation towards the achievement requirements of another qualification. All awarding organisations recognise the credits awarded by all other awarding organisations that operate within the QCF.

If learners achieve credits with other awarding organisations, they do not need to retake any assessment for the same units. The centre must keep evidence of credit achievement.

Unit format

All units in BTEC Level 5 Professional qualifications have a standard format.

Unit reference number

Each unit is assigned a unit reference number that appears with the unit title on the Register of Regulated Qualifications.

QCF level

All units and qualifications within the QCF have a level assigned to them. There are nine levels of achievement, from Entry to Level 8. The QCF Level Descriptors and, where appropriate, the NOS and/or other sector/professional benchmarks, inform the allocation of level.

Credit value

All units have a credit value. The minimum credit value that may be determined for a unit is one, and credits can only be awarded in whole numbers. Learners will be awarded credits for the successful completion of whole units.

Guided learning hours

Guided learning hours are defined as all the times when a tutor, trainer or facilitator is present to give specific guidance towards the learning aim being studied on a programme. This definition includes lectures, tutorials and supervised study in, for example, open learning centres and learning workshops. It also includes time spent by staff assessing learners' achievements. It does not include the time spent by staff marking assignments or homework where the learner is not present.

Unit aim

This gives a summary of what the unit aims to do.

Learning outcomes

The learning outcomes of a unit set out what a learner knows, understands or is able to do as the result of a process of learning.

Assessment criteria

Assessment criteria specify the standard required by the learner to achieve each learning outcome.

Units

Unit 1: Systems Analysis and Design

Unit reference number:	**F/506/2548**
QCF Level:	**5**
Credit value:	**15**
Guided learning hours:	**60**

Unit aim

This unit aims to develop learners' ability to experience system analysis and design in commercial and technical applications. Learners will analyse system requirements and translate them into specifications for systems design using recognised methodologies, including data and functional modelling techniques.

Learners will produce documentation and apply project-management techniques to a professional project.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand system modelling methodologies	1.1 explain the stages of the system life cycle 1.2 describe system modelling methodologies 1.3 evaluate the application of system modelling methodologies for a given scenario 1.4 explain the function of testing in the design stage of system modelling
2 Be able to create documented system requirements	2.1 apply methods of investigation to determine system requirements, including: • functional and non-functional requirements • user requirements • technical requirements 2.2 use a structured method and notation to describe the system requirements
3 Be able to develop functional and data models for a software system	3.1 produce functional and data models to reflect the different levels of the design process 3.2 apply a notation method, to produce a systems design 3.3 use software tools effectively to support the modelling process
4 Be able to develop software system documentation	4.1 apply agreed documentation standards to record all stages of the systems development process 4.2 develop a test strategy for a system 4.3 use software tools effectively to support the documentation process
5 Be able to use project management techniques for a professional software project	5.1 apply project-planning methods and notation to produce a project plan 5.2 use appropriate software tools effectively to support project planning

Selected assessment guidance

1.2 A minimum of two system modelling methodologies should be described.

Learning outcomes 2, 3, 4

The system must provide sufficient commercial and technical application. It would be good practice for this unit to be delivered and assessed alongside other programming units as this reflects professional approaches and standards to software development projects.

Unit 2: Introduction to Computer Programming

Unit reference number: F/506/2551

QCF Level: 4

Credit value: 15

Guided learning hours: 60

Unit aim

The aim of this unit is to introduce key programming concepts that inform a variety of contemporary programming practices, such as mobile applications development, cross-platform software development strategies and programming in multiple language environments.

The unit introduces the dominant programming paradigm of object oriented programming and its pre-cursor, procedural programming. Learners will gain understanding of the logical constructs that underlie programming languages and data concepts, including memory management issues for the creation and destruction of data structures. Consequently, the unit supports progression to multiple programming languages.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand computer programming paradigms	1.1 compare the structural similarities and differences of procedural and object programming paradigms 1.2 compare the program flow and control used in procedural and object programming paradigms 1.3 analyse the key features of an Integrated Development Environment (IDE) required for procedural and object programming paradigms
2 Understand key logical constructs used in programming	2.1 analyse the logical constructs for branching and decision making, including their translation into programming syntax 2.2 analyse the logical constructs for iteration and repetition, including their translation into programming syntax 2.3 examine the concept of an algorithm, including techniques for using them in different programming paradigms
3 Understand data and memory management issues in different programming paradigms	3.2 explain the concept of data typing, including its relationship to hardware memory allocation in different programming paradigms 3.3 explore the issues of memory allocation and de-allocation in different programming paradigms 3.4 explain the value of pointer arithmetic in handling large data structures in procedural and object oriented programming paradigms

Selected assessment guidance

1.1 This should be done on a functional and modular level, so learners can see how the concept of a class differs critically from the modularisation of functions in the procedural paradigm.

1.2 The flow of control in the two paradigms is very different. Objects take control and can return information synchronously or asynchronously to the calling function. Flow in procedural tends to be entirely synchronous.

1.3 Learners will understand the difference between a procedural console based set up and an object oriented programming (OOP) set up, in which multiple files and interfaces are organised. The issue is one of complexity.

2.1 This looks at the logical constructs and then examines the process of translating this into different programming languages. For example from single-if to multiple-if and switch statements.

2.3 An algorithm is a complex logical structure that can solve a problem. It combines selection and looping and learners should understand the different ways it can be used in different paradigms.

Unit 3: Personal and Professional Development

Unit reference number:	**T/601/0943**
QCF Level:	**5**
Credit value:	**15**
Guided learning hours:	**60**

Unit aim

The aim of this unit is to help learners to become confident in managing their personal and professional skills to achieve personal and career goals. In turn this enables them to become effective and confident self-directed employees.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand how self-managed learning can enhance lifelong development	1.1 evaluate approaches to self-managed learning 1.2 propose ways in which lifelong learning in personal and professional contexts could be encouraged 1.3 evaluate the benefits of self-managed learning to the individual and organisation
2 Be able to take responsibility for own personal and professional development	2.1 evaluate own current skills and competencies against professional standards and organisational objectives 2.2 identify own development needs and the activities required to meet them 2.3 identify development opportunities to meet current and future defined needs 2.4 devise a personal and professional development plan based on identified needs
3 Be able to implement and continually review own personal and professional development plan	3.1 discuss the processes and activities required to implement the development plan 3.2 undertake and document development activities as planned 3.3 reflect critically on own learning against original aims and objectives set in the development plan 3.4 update the development plan based on feedback and evaluation
4 Be able to demonstrate acquired interpersonal and transferable skills	4.1 select solutions to work-based problems 4.2 communicate in a variety of styles and appropriate manner at various levels 4.3 evaluate and use effective time management strategies

Unit 4: Systems Architecture

Unit reference number: K/506/2561
QCF Level: 4
Credit value: 15
Guided learning hours: 60

Unit aim

This unit aims to provide learners with the knowledge and understanding of the design of a computer based system. It will introduce learners to the concepts and practice of Networking and Operating Systems. Learners will develop and use the operating environment of such computer systems and design and build network topologies. Learners will also gain understanding of mainframe systems operation.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand how information is manipulated within a computer	1.1 explain how number systems and data representation are used to store information in a computer 1.2 describe the characteristics of Central Processing Unit (CPU) components and the operation of the Fetch Execute Cycle 1.3 describe the connection standards for a peripheral device and expansion card 1.4 describe the interfacing standards for a peripheral device and expansion card
2 Be able to configure the operating environment of computer systems	2.1 configure operating systems interface and functions 2.2 explain the role of process management in computer operating systems, including concurrent processes 2.3 describe how an operating system features can contribute to data and system security 2.4 discuss security and the measures that can be put in place to increase security
3 Understand how architectural concepts apply to the design and evaluation of networks	3.1 differentiate between different types of network topologies and network operating systems 3.2 explain the components of a network system in relation to the International Organisation Standardisation (ISO) for 7-layer model 3.3 explain the advantages and disadvantages of using networks within organisations 3.4 analyse issues related to the installation of a network within an organisation 3.5 design a network to meet a particular specification 3.6 evaluate an existing network for fitness of purpose

Learning outcomes	Assessment criteria
4 Understand how the communication process in distributed operating systems and computer networks function	4.1 describe the operation of distributed operating system describe how distributed operating systems function 4.2 analyse the functions of a data communications processes in enabling a network compared to a distributed system
5 Understand the types of processing used in mainframe systems	5.1 describe the functions of mainframe systems 5.2 describe data and process distribution in mainframe systems 5.3 explain how distribution and transaction transparency operate in mainframe systems

Unit 5: Professional Practice in an IT Context

Unit reference number:	**L/506/2553**
QCF Level:	**3**
Credit value:	**5**
Guided learning hours:	**20**

Unit aim

The aim of this unit is to develop the learner's ability to deal with work related IT issues and that encompass the wider role of the employee within an organisation.

The unit addresses the organisational and client needs that lie outside the immediate tasks of the programmer. Formal legal requirements and responsibilities of the profession are included, as are the relevant professional codes of conduct. While issues relating to professional conduct are inherent in all the units in the qualification, there is a need to address some issues directly. This is to ensure that learners are fully aware of their roles and responsibilities in the industry and are able to appreciate the wider implications of professional practice and relevant legislation.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand what is meant by professional practice	1.1 describe the role that professional bodies perform for individuals and organisations 1.2 assess the benefits of membership to professional bodies for individuals and organisations 1.3 explain the importance of quality management systems within an information technology organisation 1.4 justify the need for organisational standards to be embedded within software development
2 Understand the ethical and legislative environment relating to Information Technology activities	2.1 describe the types of conflicts of interest that can arise for IT professionals 2.2 use current information and knowledge to identify an ethical issue within an IT organisation and how this can be resolved 2.3 interpret the implications, and applicability for IT professionals of: • Data Protection Act 2003 • Computer Misuse Act 1990 2.4 evaluate the impact on an IT organisation of legislation covering: • processing of financial transactions • health and safety • privacy, confidentiality and security • copyright and intellectual property rights

Unit 6: Web Application using ASP.Net

Unit reference number:	**T/506/2563**
QCF Level:	**4**
Credit value:	**10**
Guided learning hours:	**40**

Unit aim

This unit aims to develop the learner's ability to employ .NET technologies in the development of dynamic, server-based websites.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand event driven architectures using ASP.NET	1.1 analyse user requirements for dynamic websites using Active Server Pages (ASP.NET) through event oriented concepts and technologies 1.2 explain user-driven strategies in formulating web systems architectures for dynamic websites using ASP.NET 1.3 discuss roles of varying classes and components through architectures underlying dynamic websites using ASP.NET technologies
2 Understand the importance of data flow modelling for dynamic interactive websites using ASP.NET	2.1 analyse data requirements for dynamic websites using ASP.NET concepts and technologies 2.2 evaluate data flow modelling in a client-server architecture for dynamic websites using ASP.NET 2.3 analyse class and component requirements for database management and connectivity using ASP.NET technologies
3 Be able to implement dynamic interactive websites using ASP.NET technologies	3.1 analyse client expectations against ASP.NET concepts and techniques 3.2 write class and object models as required to fulfil client and systems requirements using ASP.NET concepts and technologies 3.3 design user interface behaviours and events against requirements using ASP.NET concepts and technologies 3.4 implement through iterative cycles an object oriented dynamic website architecture using ASP.NET concepts and technologies 3.5 report technical specification ASP.NET infrastructure, behaviours and components to systems and project teams

Unit 7: Software Project

Unit reference number:	**F/506/2565**
QCF Level:	**4**
Credit value:	**5**
Guided learning hours:	**20**

Unit aim

This unit aims to develop learners ability to apply their skills to a problem. They will analyse a given problem and then design and present a solution, while interacting with employers and working in a team setting.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Be able to plan a software development project	1.1 analyse a given scenario to identify project requirements 1.2 prepare a project plan to deliver the identified requirements 1.3 use appropriate software tools effectively to support project planning
2 Be able to apply a system analysis process	2.1 investigate a system using an analysis process for the project 2.2 validate documented user and system requirements 2.3 adapt the project plan and resources to reflect changes in projects aims, objectives and scope
3 Be able to contribute towards the development of a software product	3.1 produce software components to meet given data and functionality requirements 3.2 integrate software components into a software product 3.3 test the functionality of software components in a software product
4 Be able to deliver a formal presentation evaluating the project implementation	4.1 review actual progress against the project plan 4.2 evaluate how the project team performed, identifying areas for improvement 4.3 present the project evaluation using technical language

Unit 8: Database Management Systems

Unit reference number:	**R/506/2554**
QCF Level:	**5**
Credit value:	**15**
Guided learning hours:	**60**

Unit aim

The aim of this unit is to give learners a fundamental understanding of the role and nature of a database and how it is used. This includes basic design principles, practical implementation and development skills for both system designer and software engineer.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the concepts of databases and database management systems	1.1 describe the common features of Data Base Management Systems (DBMS) 1.2 differentiate between physical and logical database structures
2 Be able to apply data analysis and database design techniques	2.1 create user requirements from a given scenario 2.2 apply data modelling techniques to refine logical data requirements and normalise to third normal form (3NF) 2.3 use a standard unified modelling language (UML) notation to document logical data requirements
3 Be able to build a physical database structure	3.1 implement database structures using Structured Query Language (SQL) Data Definition Language (DDL) 3.2 import data from text using DBMS tools 3.3 apply table and field-level security to the database 3.4 evaluate how effective security measures are in reducing risk to the database

Unit 9: Software Testing

Unit reference number: Y/506/2555
QCF Level: 5
Credit value: 15
Guided learning hours: 60

Unit aim

This unit aims to develop the knowledge, understanding and skills needed to be able to develop a systematic approach to testing in the context of the complete software life cycle. The unit will build on learners' prior knowledge of a range of aspects of software development and enable them to become capable users of testing tools.

The unit will give learners practical skills that will enable them to make an effective contribution to software testing as professional software engineers.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the management of testing using different strategies	1.1 analyse how software testing differs for different strategies 1.2 describe the stages of system testing, including: • alpha • beta • acceptance 1.3 evaluate different software testing tools available for the automation of the testing process
2 Understand different techniques for testing	2.1 analyse different functional testing techniques 2.2 differentiate between the purposes of functional and structural testing
3 Be able to a test a process for a software solution for a broadly defined scenario	3.1 develop a viable test plan comprising: • test specification (including functional and structural techniques) • estimation and scheduling • checking • recording • evaluation 3.2 implement a test plan effectively 3.3 produce an accurate test report

Unit 10: Event Driven Programming

Unit reference number:	**M/506/2559**
QCF Level:	**4**
Credit value:	**5**
Guided learning hours:	**20**

Unit aim

This unit aims to develop the learner's ability to create Windows-based, Graphical User Interface (GUI) based applications using the Microsoft .NET framework of languages and development tools.

Learners will design and develop a user interface and build event code to add functionality. They will define the key elements of event-driven programs and apply them to a typical software problem. Documentation standards will be used at system and user levels. Learners will also evaluate the effectiveness of a software solution against the problem scenario.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the key concepts of event-driven programming	1.1 explain the components involved in event-driven programming in a Windows environment, including Button, RadioButton, ListBox, Label, TextBox, and Form 1.2 analyse the ease of event driven developments, including simplicity of programming, using Windows-based development tools
2 Be able to design and construct a graphical user interface using an event driven language to solve a software problem	2.1 develop prototype sketches for a given scenario, outlining events with corresponding actions which may occur in the system 2.2 create a graphical user interface using Windows-based, event-driven development tools
3 Be able to develop an event driven program to solve a software problem	3.1 implement required functionality into a graphical user interface 3.2 implement a navigation system to access a range of forms 3.3 apply debugging techniques to ensure the proposed system is free from error 3.4 generate technical user documentation to support the system
4 Be able to evaluate the effectiveness of the solution to a software problem	4.1 apply a testing plan to a proposed solution by creating a test plan defining test data (including valid and invalid data) 4.2 evaluate the finished product, comparing against the initial problem 4.3 suggest possible areas for further development

Unit 11: Object Oriented Programming

Unit reference number:	**H/506/2560**
QCF Level:	**5**
Credit value:	**15**
Guided learning hours:	**60**

Unit aim

This unit aims to develop the learner's ability to fully utilise object oriented concepts, methods and techniques so as to develop software solutions that are scalable, reusable and flexible.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the creation and use of class instances within a programming environment	1.1 explain issues of instantiating classes within scope of client operations in order to access methods and data 1.2 explain principles of accessing object methods requiring multivariable parameters and return values 1.3 explain principles of manipulating object data with methods requiring multivariable parameters and return values1.4 explain the principles of selecting and implementing methods from library classes by defining necessary environment techniques
2 Understand architectural and behavioural principles for the development of user-defined classes	2.1 justify user-defined classes internal and external organisational structures using object oriented architectural principles 2.2 analyse the role of object oriented behaviour and interaction modelling techniques in complementing architectural modelling and design 2.3 explain principles of data encapsulation, custom methods, constructor and destructor operations in their role in object oriented programming
3 Be able to implement software solutions using object oriented analytical methods, design models and programming strategies	3.1 analyse software requirements within client defined contexts using object based analytical tools and modelling 3.2 design class and object architectures with interactions using established techniques justifying your actions 3.3 design user interface behaviours and events using interface protocols and definitions 3.4 prototype object oriented designed models with simplified data structures to present to client and measure against requirements 3.5 implement, test, debug, and release a software solution using iterative development practices 3.6 produce technical documentation of object oriented infrastructure, behaviours and components to serve development team and user documentation generation

Selected Assessment Guidance

Centres delivering Unit 11 Object Orientated Programming must ensure that learners complete a separate assessment activity for this unit and other related units. For example the assessment activity for Unit 11 should be different to the activity for *Unit 13: Programming in C++* or for *Unit 20: Mobile App Development (iOS).*

Unit 12: Mainframe Programming in Cobol

Unit reference number:	**L/506/2567**
QCF Level:	**4**
Credit value:	**15**
Guided learning hours:	**60**

Unit aim

The aim of this unit is to give learners an understanding of the principles of the COBOL procedural programming language as used in the mainframe environment. The unit will enable learners to design procedural programming solutions.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the principles of the COBOL procedural language	1.1 discuss the principles of procedural programming 1.2 develop a procedural program in COBOL that includes functions.
2 Be able to design COBOL procedural programming solutions	2.1 identify the program divisions with data and file structures required to implement a given design 2.2 design a procedural programming solution for a given problem
3 Be able to implement COBOL procedural programming solutions	3.1 select and implement control structures to meet the design algorithms 3.2 implement a solution which uses an appropriate modular design with suitable software structures and efficient COBOL programming code 3.3 implement a procedural solution based on a prepared design including Jackson Structured Programming (JSD)
4 Be able to test procedural programming solutions	4.1 critically review and test a procedural programming solution 4.2 analyse actual test results against expected results to identify discrepancies 4.3 evaluate independent feedback on a developed procedural programming solution and make recommendations for improvements 4.4 create documentation for the support and maintenance of a procedural programming solution

Unit 13: Programming in C++

Unit reference number:	**R/506/2568**
QCF Level:	**5**
Credit value:	**20**
Guided learning hours:	**80**

Unit aim

This unit aims to develop the learner's ability to design, build and test programs using the C++ programming language.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Be able to develop a solution using C++	1.1 develop C++ software programs using a variety of constructs, including data types and structures 1.2 develop software solutions using C++ objects 1.3 use structured exception handling to develop software using C++ 1.4 evaluate namespace implementation in C++ 1.5 summarise the principles of the standard template library, including how they can be implemented in C++ 1.6 analyse the development of effective managed code in C++
2 Be able to apply different methods using C++	2.1 enhance applications using third-party graphics libraries in C++ 2.2 create application solutions that utilise databases in C++ 2.3 demonstrate applications that employ effective memory management techniques in C++
3 Be able to utilise advanced template programming techniques	3.1 analyse compiler operations when parsing template code 3.2 describe template programming idioms in C++ 3.3 recommend how policy based design in C++ can be applied in the scenario

Unit 14: Developing Software Applications using C#

Unit reference number: Y/506/2569
QCF Level: 5
Credit value: 20
Guided learning hours: 80

Unit aim

This unit aims to develop the learner's ability to develop applications in C# using file input and output processes, advanced features and ADO.net.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Be able to develop a solution using C#	1.1 develop C# software programs using a variety of constructs, including data types and structures 1.2 develop software solutions using C# objects 1.3 use structured exception handling to develop software using C# 1.4 apply collections and generics in developing C# software 1.5 analyse the development of effective managed code in C#
2 Be able to perform File I/O using C#	2.1 use C# file objects to develop software to process data 2.2 use object serialisation formats to process data
3 Be able to apply the advanced features of C#	3.1 create a software solution using delegates, events and lambdas 3.2 create a software solution using indexers, operators and pointers 3.3 apply Language-Integrated Query (LINQ) to expressions, generic and non-generic collections
4 Be able to develop ADO.Net software solutions	4.1 implement ADO.Net Connection Layer 4.2 implement ADO.Net Disconnected Layer 4.3 develop LINQ API's software solutions with ADO.Net

Unit 15: Commercial Software Testing

Unit reference number:	**L/506/2570**
QCF Level:	**5**
Credit value:	**20**
Guided learning hours:	**80**

Unit aim

This unit aims to develop understanding of testing strategies, techniques, and the management of their application.

Learners will be given the opportunity to embed testing strategies to understand the importance that testing has within the software development lifecycle.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand testing strategies and test management	1.1 explain how software testing differs across unit, integration and system testing 1.2 assess the stages of system testing to include alpha, beta, and acceptance testing
2 Understand black box and white box (functional and structural) testing techniques	2.1 compare functional (black box) with structural (white box) testing 2.2 explain how regression testing seeks to uncover software bugs through changes in the code 2.3 evaluate the differences between dynamic and static testing 2.4 describe risk-based testing, including how product risks could be addressed
3 Understand a test process for a software solution	3.1 describe the role of the test team 3.2 develop a test plan including: • test specification (including functional and structural techniques) • estimation and scheduling • checking together with recording 3.3 implement a test plan 3.4 evaluate the test plan to produce a test report

Learning outcomes	Assessment criteria
4 Be able to use an automated testing tool to test a software solution	4.1 implement a test plan using an automated testing tool 4.2 evaluate the effectiveness of an automated testing tool 4.3 evaluate an automated test report 4.4 modify an automated test script to take into consideration a modification to the program being tested
5 Be able to undertake test analysis for a software solution	5.1 describe what is meant by test analysis 5.2 analyse a situation to determine test environment requirements 5.3 evaluate the effectiveness of deploying test design techniques5.4 analyse a practical testing situation selecting appropriate test design techniques 5.5 explain the concept of coverage using suitable measures of coverage for a software solution 5.6 evaluate the importance of defining what coverage measures mean in a practical situation 5.7 analyse a practical testing situation adopting appropriate coverage measures

Unit 16: Cloud Computing

Unit reference number: K/506/2575
QCF Level: 5
Credit value: 15
Guided learning hours: 60

Unit aim

The aim of this unit is to enable learners to understand cloud computing concepts, how it has emerged and the standards and models associated with cloud computing.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the principles of distributed computing	1.1 explain what is meant by distributed computing, including the key applications and architectures involved 1.2 compare the theoretical models employed by distributed heterogeneous systems 1.3 discuss the relationship between distributed computing and cloud computing
2 Understand cloud computing	2.1 discuss the principles of cloud computing, including the characteristics, architectures and service models involved 2.2 contrast the different cloud computing deployment models 2.3 explain the benefits and risks involved with cloud computing
3 Be able to design a cloud computing system	3.1 design a cloud computing solution to meet a client's requirements 3.2 discuss the business benefits and risks of the solution designed
4 Be able to develop a cloud computing systems	4.1 develop a cloud computing solution 4.2 create documentation for the support and maintenance of the cloud solution 4.3 evaluate the cloud computing solution, including improvements

Unit 17: Web Services Development

Unit reference number:	**T/506/2577**
QCF Level:	**5**
Credit value:	**15**
Guided learning hours:	**60**

Unit aim

The aim of this unit is to enable learners to understand the concepts and evolution of web services, and apply the skills learned to develop and test web services using a number of different technologies. Learners will also be able to implement a test strategy, to document and evaluate their own web service.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the principles of web services development	1.1 define web services and their applications 1.2 explain how web technologies can be used in distributed information systems 1.3 explain the key components of resource-oriented architecture 1.4 define the key architectural properties of Representational State Transfer (REST)
2 Be able to design a web service	2.1 determine criteria for selecting web service implementation technology based on user requirements 2.2 using REST principles, determine resources and HTTP methods required to implement a web service 2.3 analyse the resources required for the associated requests and responses 2.4 implement exception handling that returns the appropriate HTTP response codes and error messages
3 Be able to implement a web service	3.1 install a live web server capable of hosting a web service 3.2 configure the live web server for use 3.3 develop a web service using an appropriate programming language 3.4 implement a suitable authentication mechanism 3.5 develop a web service client

Learning outcomes	Assessment criteria
4 Be able to test and document a web service	4.1 optimise a web service using a range of tools 4.2 analyse actual test results against expected results to identify discrepancies 4.3 evaluate independent feedback on a developed web service and make recommendations for improvements 4.4 create documentation to assist the users of a computer program

Unit 18: Job Control Language (JCL)

Unit reference number:	**A/506/2578**
QCF Level:	**5**
Credit value:	**15**
Guided learning hours:	**60**

Unit aim

The aim of this unit is to give learners an understanding of the principles of Job Control Language (JCL) scripting language as used in the mainframe environment. The unit will enable learners to design and implement JCL alongside procedural programming solutions.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the principles of the JCL scripting language	1.1 discuss the principles of a JCL scripting language 1.2 evaluate the suitability of using a JCL scripting language
2 Be able to design JCL scripting language solutions	2.1 explain the constructs required to implement a given design, including script units, data and file structures 2.2 design a scripting solution for a given problem
3 Be able to implement JCL scripting language solutions	3.1 implement selected control structures to meet the design algorithms 3.2 implement a scripting solution, which uses software structures, datasets and statements 3.3 implement a scripting solution based on a prepared design
4 Be able to test JCL scripting language solutions	4.1 evaluate a viable scripting language solution 4.2 analyse actual test results against expected results to identify discrepancies 4.3 evaluate independent feedback on a developed scripting language solution, including recommendations for improvement 4.4 create documentation for the support and maintenance of a scripting language solution

Selected assessment guidance

3.1 a minimum of two control structures should be used to meet the design algorithms.

Unit 19: Mobile App Development (Android)

Unit reference number:	**F/506/2579**
QCF Level:	**5**
Credit value:	**15**
Guided learning hours:	**60**

Unit aim

The aim of this unit is to give learners an understanding of the principles of event-driven and object oriented programming in mobile technologies. Learners will gain an understanding of the specific features of Android mobile development, the development tools and languages, which will enable them to design and implement Android applications for given requirements.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the principles of mobile application development for the Android mobile platform	1.1 discuss the principles of event-driven programming 1.2 discuss the principles of programming in Java 1.3 discuss the principle of programming in Extendable Markup Language (XML)
2 Be able to design software programs for the Android mobile platform using Java and XML	2.1 design a programming solution for the Android mobile platform, including screen components, data structures and file structures
3 Be able to develop Android mobile software solutions	3.1 implement an event-driven solution based on a prepared design for the Android mobile platform 3.2 implement event handling using control structures to meet the design algorithms for the Android mobile platform 3.3 define relationships between objects to implement the solution for an Android mobile device 3.4 implement object behaviours using control structures to implement the solution for an Android mobile device 3.5 determine opportunities for error handling and reporting 3.6 make effective use of an Integrated Development Environment (IDE) including code and screen templates

Learning outcomes	Assessment criteria
4 Be able to test Android solutions for mobile technologies	4.1 critically test a software program for an Android mobile device, including the expected and actual test results 4.2 analyse actual test results against expected results to identify discrepancies 4.3 evaluate independent feedback about the Android mobile software program 4.4 create documentation for the support and maintenance of the Android mobile software program

Unit 20: Mobile App Development (iOS)

Unit reference number:	**T/506/2580**
QCF Level:	**5**
Credit value:	**15**
Guided learning hours:	**60**

Unit aim

The aim of this unit is to give learners an understanding of the principles of event-driven and object oriented programming in mobile technologies. Learners will gain an understanding of the specific features of Apple iOS development, development tools and language, which will enable them to design and implement iOS applications for given requirements.

Learning outcomes and assessment criteria

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

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the principles of mobile application development for the iOS platform	1.1 discuss the principles of event-driven programming 1.2 discuss the principles of programming in Objective-C 1.3 evaluate the flexibility of the development environment used to program Objective-C for the iOS platforms
2 Be able to design Objective-C software programs for the iOS platform	2.1 design a programming solution for the iOS platform, including screen components, data structures and file structures 2.2 justify the use of an Application Programming Interface (API) to solve a given problem
3 Be able to develop an iOS mobile software solution using Objective-C	3.1 implement event handling using control structures to meet the design algorithms for the iOS mobile platform 3.2 define relationships between objects to implement the solution for an iOS mobile device 3.3 implement object behaviours using control structures to meet the design algorithms for an iOS mobile device 3.4 determine procedures for error handling and reporting 3.5 make effective use of an Integrated Development Environment (IDE) including code and storyboard segues

Learning outcomes	Assessment criteria
4 Be able to test the software solution for an iOS mobile platform	4.1 critically test a software program for an iOS mobile device, including the expected and actual test results 4.2 analyse actual test results against expected results to identify discrepancies 4.3 evaluate independent feedback about the iOS software solution 4.4 create documentation for the support and maintenance of the iOS software solution

Further information and useful publications

To get in touch with us visit our 'Contact us' pages:

- Edexcel: **www.edexcel.com/contactus**
- BTEC: **www.edexcel.com/btec/Pages/Contactus**
- Pearson Work Based Learning and Colleges: **www.edexcel.com/about.wbl/Pages/Contact-us**
- books, software and online resources for UK schools and colleges: www.pearsonschoolsandfecolleges.co.uk

Key publications:

- *Adjustments for candidates with disabilities and learning difficulties – Access and Arrangements and Reasonable Adjustments, General and Vocational qualifications* (Joint Council for Qualifications (JCQ))
- *Equality Policy* (Pearson)
- *Recognition of Prior Learning Policy and Process* (Pearson)
- *UK Information Manual* (Pearson)
- *UK Quality Vocational Assurance Handbook* (Pearson).

All of these publications are available on our website.

Publications on the quality assurance of BTEC qualifications are available on our website at www.edexcel.com/btec/delivering-BTEC/quality/Pages

Our publications catalogue lists all the material available to support our qualifications. To access the catalogue and order publications, please go to www.edexcel.com/resources/publications/Pages

Additional resources

If you need further learning and teaching materials to support planning and delivery for your learners, there is a wide range of BTEC resources available.

Any publisher can seek endorsement for their resources, and, if they are successful, we will list their BTEC resources on our website at: www.edexcel.com/resources/publications/Pages

How to obtain National Occupational Standards

Please contact:

The National Occupational Standards for IT and Telecoms Professionals
e Skills UK
1 Castle Lane
London
SW1 6DR

Telephone: +44 (0)207 963 8920
Fax: +44 (0)207 592 9138
Email: info@e-skills.com
Website: www.e-skills.com

Professional development and training

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The support we offer focuses on a range of issues, such as:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing learner-centred learning and teaching approaches
- building in effective and efficient quality assurance systems.

The national programme of training we offer is on our website at: www.edexcel.com/resources/Training. You can request centre-based training through the website or you can contact one of our advisers in the Training from Pearson UK team via Customer Services to discuss your training needs.

BTEC training and support for the lifetime of the qualifications

Training and networks: our training programme ranges from free introductory events through sector-specific opportunities to detailed training on all aspects of delivery, assignments and assessment. We also host some regional network events to allow you to share your experiences, ideas and best practice with other BTEC colleagues in your region.

Regional support: our team of Curriculum Development Managers and Curriculum Support Consultants, based around the country, are responsible for providing advice and support in centres. They can help you with planning and curriculum developments.

To get in touch with our dedicated support teams please visit: www.edexcel.com/contactus

Your Pearson support team

Whether you want to talk to a sector specialist, browse online or submit your query for an individual response, there's someone in our Pearson support team to help you whenever – and however – you need:

- Subject Advisors: find out more about our subject advisor team – immediate, reliable support from a fellow subject expert – at: www.edexcel.com/Aboutus/contact-us/Pages
- Ask the Expert: submit your question online to our Ask the Expert online service www.edexcel.com/aboutus/contact-us/ask-expert/Pages and we will make sure your query is handled by a subject specialist.

Annexe A

The Edexcel/BTEC qualification framework for the information technology sector

Progression opportunities within the framework.

Level	General qualifications	BTEC full vocationally-related qualifications	BTEC Professional/ Specialist courses	NVQ/occupational
8	PhD/DPhil Professional doctorates (credit based), e.g. EdD			
7	Master's degrees Postgraduate diplomas			
6	Bachelor's degrees, e.g. BA, BSc			
5		Computing and Systems Development HND	Professional Software Development	
4		Computing and Systems Development HNC		Higher Apprenticeships in IT, Software, Web and Telecoms Professionals
3				
2				
1				
Entry				

Annexe B

Wider curriculum mapping

BTEC Level 5 qualifications give learners opportunities to develop an understanding of spiritual, moral, ethical, social and cultural issues as well as an awareness of citizenship, environmental issues, European developments, health and safety considerations and equal opportunities issues.

Spiritual, moral, ethical, social and cultural issues

Throughout the delivery of these qualifications learners will have the opportunity to actively participate in different kinds of decision making. They will have to consider fair and unfair situations and explore how to resolve conflict. Working in small groups they will learn how to respect and value others' beliefs, backgrounds and traditions.

Citizenship

Learners undertaking these qualifications will have the opportunity to develop their understanding of citizenship issues.

Environmental issues

Developing a responsible attitude towards the care of the environment is an integral part of this qualification. Learners are encouraged to minimise waste and discuss controversial issues.

European developments

Much of the content of the qualification applies throughout Europe, even though the delivery is in a UK context.

Health and safety considerations

Health and safety is embedded within many of the units in this qualification. Learners will consider their own health and safety at work, how to identify risks and hazards and how to minimise those risks.

Equal opportunities issues

There will be opportunities throughout this qualification to explore different kinds or rights and how these affect both individuals and communities, for example learners will consider their rights at work and the rights of employers and how these rights affect the work community.

Annexe C

Glossary of accreditation terminology

Accreditation start/end date	The first/last dates that Pearson can register learners for a qualification.
Certification end date	The last date on which a certificate may be issued by Pearson.
Credit value	All units have a credit value. The minimum credit value that may be determined for a unit is one, and credits can only be awarded in whole numbers. Learners will be awarded credits for the successful completion of whole units.
Guided Learning Hours (GLH)	Guided learning hours are defined as all the times when a tutor, trainer or facilitator is present to give specific guidance towards the learning aim being studied on a programme. This definition includes lectures, tutorials and supervised study in, for example, open learning centres and learning workshops. It also includes time spent by staff assessing learners' achievements. It does not include time spent by staff in day-to-day marking of assignments or homework where the learner is not present.
Learning Aims Database	Link to the Learning Aims Database, which features detailed funding information by specific learning aim reference.
Learning Aim Reference	Unique reference number given to the qualification by the funding authorities on accreditation.
Level	The level at which the qualification is positioned in the Qualifications and Credit Framework (QCF).
Performance tables	These qualifications are listed on the Department for Education (DfE) website School and College Achievement and Attainment Tables (SCAAT) as performance indicators for schools and colleges.
Qualification Number (QN)	Unique reference number given to the qualification by the regulatory authorities on accreditation.
Register of Regulated Qualifications	Link to the entry on the Register of Regulated Qualifications for a particular qualification. This database features detailed accreditation information for the particular qualification.
Section 96	Section 96 is a section of the Learning and Skills Act 2000. This shows for which age ranges the qualification is publicly funded for under-19 learners.
Title	The accredited title of the qualification.
UCAS points	These qualifications are listed on the Universities and Colleges Admissions Service (UCAS) tariff for those wishing to progress to higher education.

Annexe D

BTEC Specialist and Professional qualifications

BTEC qualifications on the NQF	Level	BTEC Specialist and Professional qualifications on the QCF	BTEC qualification suites on the QCF
BTEC Level 7 Advanced Professional qualifications BTEC Advanced Professional Award, Certificate and Diploma	**7**	**BTEC Level 7 Professional qualifications** BTEC Level 7 Award, Certificate, Extended Certificate and Diploma	
BTEC Level 6 Professional qualifications BTEC Professional Award, Certificate and Diploma	**6**	**BTEC Level 6 Professional qualifications** BTEC Level 6 Award, Certificate, Extended Certificate and Diploma	
BTEC Level 5 Professional qualifications BTEC Professional Award, Certificate and Diploma	**5**	**BTEC Level 5 Professional qualifications** BTEC Level 5 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 5 Higher Nationals** BTEC Level 5 HND Diploma
BTEC Level 4 Professional qualifications BTEC Professional Award, Certificate and Diploma	**4**	**BTEC Level 4 Professional qualifications** BTEC Level 4 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 4 Higher Nationals** BTEC Level 4 HNC Diploma
BTEC Level 3 qualifications BTEC Award, Certificate, Extended Certificate and Diploma	**3**	**BTEC Level 3 Specialist qualifications** BTEC Level 3 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 3 Nationals** BTEC Level 3 Certificate, Subsidiary Diploma, Diploma and Extended Diploma

BTEC qualifications on the NQF	Level	BTEC Specialist and Professional qualifications on the QCF	BTEC qualification suites on the QCF
BTEC Level 2 qualifications BTEC Award, Certificate, Extended Certificate and Diploma	**2**	**BTEC Level 2 Specialist qualifications** BTEC Level 2 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 2 Firsts** BTEC Level 2 Certificate, Extended Certificate and Diploma
BTEC Level 1 qualifications BTEC Award, Certificate, Extended Certificate and Diploma	**1**	**BTEC Level 1 Specialist qualifications** BTEC Level 1 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 1 qualifications** BTEC Level 1 Award, Certificate and Diploma (vocational component of Foundation Learning)
	E	**BTEC Entry Level Specialist qualifications** BTEC Entry Level Award, Certificate, Extended Certificate and Diploma	**BTEC Entry Level qualifications (E3)** BTEC Entry Level 3 Award, Certificate and Diploma (vocational component of Foundation Learning)

NQF = National Qualifications Framework

QCF = Qualifications and Credit Framework

For most qualifications on the **NQF**, the accreditation end date is normally 31 August 2010 or 31 December 2010.

For qualifications on the **QCF**, the accreditation start date is usually 1 September 2010 or 1 January 2011.

QCF qualification sizes	
Certificate	13-36 credits
Diploma	37+ credits
Extended Diploma	150 credits

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For more information on Edexcel and BTEC qualifications please visit our websites: www.edexcel.com and www.btec.co.uk