Pearson
BTEC Level 4 Diploma in Software Development Methodologies

Specification

BTEC Professional qualification

First teaching February 2020

Edexcel, BTEC and LCCI qualifications

Edexcel, BTEC and LCCI qualifications are awarded by Pearson, the UK's largest awarding body offering academic and vocational qualifications that are globally recognised and benchmarked. For further information, please visit our qualification websites at www.edexcel.com, www.btec.co.uk or www.lcci.org.uk. Alternatively, you can get in touch with us using the details on our contact us page at qualifications.pearson.com/contactus

About Pearson

Pearson is the world's leading learning company, with more than 24,000 employees in more than 70 countries working to help people of all ages to make measurable progress in their lives through learning. We put the learner at the centre of everything we do, because wherever learning flourishes, so do people. Find out more about how we can help you and your learners at qualifications.pearson.com

References to third party material made in this specification are made in good faith. Pearson does not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)

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

ISBN 978 1 446 96090 5

Contents

1 Introducing BTEC Specialist qualifications

What are BTEC Professional qualifications?

BTEC Professional qualifications are work-related qualifications available from Level 4 to Level 8 in a range of sectors. They give learners the knowledge, understanding and skills they need to prepare for employment in a specific occupational area.

BTEC Professional qualifications put learning into the context of the world of work, giving learners the opportunity to apply their research, skills and knowledge in relevant and realistic work contexts. This applied, practical approach means learners develop the knowledge, understanding and skills they need for career progression or further study. As such, these qualifications are well suited to support the delivery of the Apprenticeship Standards.

The qualifications may be offered as full-time or part-time courses in colleges, training centres and through employers.

Sizes of BTEC Professional qualifications

For all regulated qualifications, Pearson specifies a total estimated number of hours that learners will require to complete and show achievement for the qualification – this is the Total Qualification Time (TQT). The TQT value indicates the size of a qualification.

Within the TQT, Pearson identifies the number of Guided Learning Hours (GLH) that we estimate a centre delivering the qualification might provide. Guided learning means activities, such as lessons, tutorials, online instruction, supervised study and giving feedback on performance, that directly involve tutors and assessors in teaching, supervising and invigilating learners. Guided learning includes the time required for learners to complete external assessment under examination or supervised conditions.

In addition to guided learning, other required learning directed by tutors or assessors includes private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

As well as TQT and GLH, qualifications can also have a credit value – equal to one-tenth of the TQT, rounded to the nearest whole number.

TQT and credit values are assigned after consultation with employers and training providers delivering the qualifications.

BTEC Specialist qualifications are generally available in the following sizes:

- Award – a qualification with a TQT value of 120 or less (equivalent to a range of 1–12 credits)
- Certificate – a qualification with a TQT value in the range of 121–369 (equivalent to a range of 13–36 credits)
- Diploma – a qualification with a TQT value of 370 or more (equivalent to 37 credits and above).

2 Qualification summary and key information

Qualification title	Pearson BTEC Level 4 Diploma in Software Development Methodologies
Qualification Number (QN)	603/5453/7
Regulation start date	28/01/2020
Operational start date	01/02/2020
Approved age ranges	16–18 19+ Please note that sector-specific requirements or regulations may prevent learners of a particular age from embarking on this qualification. Please see *Section 6 Access and recruitment*.
Total Qualification Time (TQT)	370 hours.
Guided Learning Hours (GLH)	90.
Assessment	External assessment – multiple-choice test.
Grading information	The qualification and unit are at Pass grade.
Entry requirements	No prior knowledge, understanding, skills or qualifications are required before learners register for this qualification. However, it is recommended that learners have experience of working in the digital sector or that they have achieved a relevant qualification, such as a Level 3 information and communication technologies qualification. Centres must follow the guidance given in our document *A guide to recruiting learners onto Pearson qualifications* (see *Section 6 Access and recruitment*).
Funding	Qualifications eligible and funded for post-16-year-olds can be found on the funding Hub. The Education and Skills Funding Agency also publishes a funding catalogue that lists the qualifications available for 19+ funding. The Apprenticeship funding rules can be found at www.gov.uk

Centres will need to use the Qualification Number (QN) when they seek public funding for their learners. The qualification title, unit titles and QN will appear on each learner's final certificate. Centres should tell learners this when recruiting them and registering them with Pearson. There is more information about certification in our *UK Information Manual,* available on our website, qualifications.pearson.com

3 Qualification purpose

Qualification objectives

The Pearson BTEC Level 4 Diploma in Software Development Methodologies develops the knowledge and understanding that learners need to carry out the job role of software developer relating to software development methodologies. The qualification also enables learners to achieve the knowledge modules required to complete the on-programme element of the Software Developer Apprenticeship.

The qualification gives learners the opportunity to:

- develop knowledge related to software development
- develop technical knowledge and understanding of software development methodologies
- achieve a Level 4 qualification
- develop personal growth and engagement in learning.

Apprenticeships

The Pearson BTEC Level 4 Diploma in Software Development Methodologies meets one of the mandatory gateway requirements in the Software Developer Level 4 Apprenticeship Standard.

Learners must achieve this qualification, or the equivalent British Computer Society (BCS) Systems Development Essentials vendor qualification, before progressing to the end-point assessment.

The knowledge outcomes from the Software Developer Apprenticeship Standard covered by the BTEC Level 4 Diploma in Software Development Methodologies are:

- understands and operates at all stages of the software development lifecycle
- understands the similarities and differences (taking into account positives and negatives of both approaches) between agile and waterfall software development methodologies
- understands how teams work effectively to produce software and contributes appropriately.

Progression opportunities

Learners who achieve the qualification and who have met all other specified requirements of the Software Developer Apprenticeship Standard, can progress to achieving the full Apprenticeship certification that confirms competency in the software developer job role.

With further training and development, learners can progress to more senior or complex job roles such as senior software developer. Learners will also be eligible to apply for registration onto the Register of IT Technicians, confirming Skills Framework for the Information Age (SFIA) Level 3 professional competence, on completing the apprenticeship.

Alternatively, learners who have achieved the qualification but not completed the full apprenticeship requirements, could progress to a job role such as software engineer, UI designer, UX designer, programmer/coder, applications developer, web developer, games developer or to other qualifications such as the BTEC Level 5 Higher National Diploma in Computing.

Industry support and recognition

This qualification is based on the requirements set out in the Software Developer Apprenticeship Standard issued by the Tech Partnership.

The employers involved in creating the Standard are:

Accenture, British Airways (BA), The British Computer Society (BCS) – The Chartered Institute for IT, British Telecom (BT), Capgemini, Cisco, Fujitsu, Hewlett Packard (HP), The International Business Machines Corporation (IBM), John Lewis, Lloyds, Microsoft, National Crime Agency (NCA), Telefonica, The Royal Signals, Telefonica, The Test Factory, Virgin Media, Visa.

4 Qualification structure

Pearson BTEC Level 4 Diploma in Software Development Methodologies

The learner will need to meet the requirements outlined in the table below before Pearson can award the qualification.

Minimum number of units that must be achieved	1

Unit number	Mandatory unit	Level	Guided Learning Hours
1	Software Development Methodologies	4	90

5 Centre resource requirements

As part of the approval process, centres must make sure that the resource requirements below are in place before offering the qualification.

- Centres must have appropriate physical resources (for example IT, learning materials, teaching rooms) to support the delivery and assessment of the qualification.
- Staff involved in the assessment process must have relevant expertise and occupational experience.
- There must be systems in place that ensure continuing professional development (CPD) for staff delivering the qualification.
- Centres must have appropriate health and safety policies in place that relate to the use of equipment by learners.
- Centres must deliver the qualifications in accordance with current equality legislation. For further details on Pearson's commitment to the Equality Act 2010, please see *Section 6 Access and recruitment*. For full details of the Equality Act 2010, visit www.legislation.gov.uk

For information on the requirements for implementing assessment processes in centres, please refer to the *BTEC UK Quality Assurance Centre Handbook* available on our website.

6 Access and recruitment

Our policy on access to our qualifications is that:

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

Centres must ensure that their learner recruitment process is conducted with integrity. This includes ensuring that applicants have appropriate information and advice about the qualification to ensure that it will meet their needs.

Centres should review applicants' prior qualifications and/or experience, considering whether this profile shows that they have the potential to achieve the qualification.

We refer centres to our *Equality, diversity and inclusion policy*, which can be found in the support section of our website.

Prior knowledge, skills and understanding

No prior knowledge, understanding, skills or qualifications are required for learners to register for this qualification. However, it is recommended that learners have either experience of working in the digital sector or have achieved a relevant qualification (such as a level 3 information and communication technologies qualification).

Access to qualifications for learners with disabilities or specific needs

Equality and fairness are central to our work. Our *Equality, diversity and inclusion policy* requires all learners to have equal opportunity to access our qualifications and assessments and that our qualifications are 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.

For learners with disabilities and specific needs, the assessment of their potential to achieve the qualification must identify, where appropriate, the support that will be made available to them during delivery and assessment of the qualification.
Please see *Section 8 Assessment* for information on reasonable adjustments and special consideration.

7 Programme delivery

Centres are free to offer this qualification using any mode of delivery that meets learners' and employers' needs. It is recommended that centres make use of a wide range of training delivery methods, including direct instruction in classrooms, simulated demonstrations, research or applied projects, e-learning, directed self-study, field visits and role play. Whichever mode of delivery is used, centres must make sure that learners have access to the resources identified in the specification and to the subject specialists delivering the unit.

Centres must adhere to the Pearson policies that apply to the different models of delivery. Our document, *Collaborative and consortium arrangements for the delivery of vocational qualifications policy*, is available on our website.

Those planning the programme should aim to enhance the vocational nature of the qualification by:

- spending time with employers to better understand their organisational requirements and the methods of training that are most suitable, taking into consideration their available resources and working patterns
- collaborating with employers to ensure that learners have opportunities in the workplace to implement the knowledge and skills developed through the training programme
- developing up-to-date and relevant teaching materials that make use of scenarios relevant to the sector and relevant occupation
- giving learners the opportunity to apply their learning in realistic practical activities
- having regular meetings with employers to discuss learner progress, providing feedback and agreeing how any issues will be resolved
- developing projects or assessments, with input from employers.

Where legislation is taught, centres must ensure that it is current and up to date.

Where a unit is externally assessed, it is essential that learners have covered all of the *Unit content* before they are tested.

For further information on the delivery and assessment of the Apprenticeships Standards please refer to document, *Apprenticeship funding: rules and guidance for employers* at www.gov.uk/government/collections/sfa-funding-rules.

8 Assessment

The table below gives a summary of the assessment methods used in the qualification.

Assessment method
External assessment (onscreen test).

In administering external assessments, centres need to be aware of the specific procedures and policies that apply to, for example, registration, entries and results. More information can be found in our *UK Information Manual*, available on our website.

Language of assessment

External assessments for the unit in this qualification will be available in English only.

A learner taking the qualification may be assessed in British or Irish Sign Language where it is permitted for the purpose of reasonable adjustment.

Further information on the use of language in qualifications is available in our *Use of languages in qualifications policy* document, available on our website.

For further information on access arrangements, please refer to the *Granting reasonable adjustments* paragraph.

External assessment

The table below gives information about the type and availability of external assessments that are available for this qualification. Centres should check this information carefully together with the relevant unit specifications and the sample assessment materials so that they can timetable learning and assessment periods appropriately.

Unit 1: Software Development Methodologies	
Type of assessment	Onscreen test using multiple-choice items.
Length of as assessment	The external assessment will be 1 hour.
Number of questions	30
Assessment availability	On demand
First assessment availability	June 2020

Pearson sets and marks the external assessments.

The external assessment assesses the learning outcomes in the unit to meet the standard specified by the related assessment criteria. The content in the unit is mandatory for the assessments and will be sampled across different versions of the assessment over time. Therefore, it is essential that learners have full knowledge of the unit content before they are entered for the onscreen test.

Centres need to make sure that learners are:

- fully prepared to sit the external assessments
- entered for the tests at appropriate times, with due regard for resit opportunities as necessary.

Information about the structure and format of the assessments is available in the unit in *Section 10 Unit.*

Information about registering learners for the test and the systems requirements for delivering the onscreen tests is available on our website.

Sample assessment materials

Each externally-assessed unit has a set of sample assessment materials (SAMs). The SAMs are there to provide an example of what the external assessment will look like in terms of the feel and level of demand of the assessment.

SAMs show the range of possible question types that may appear in the actual assessments and give a good indication of how the assessments will be structured.

While SAMs can be used for practice with learners as with any assessment the content covered, and specific details of the questions asked, will change in each assessment.

A copy of each of these assessments can be downloaded from the qualification page on our website.

Resits

Learners who take the onscreen test and do not perform as expected are allowed the opportunity to resit the assessment. Opportunity for resits is purely at the centre's discretion. Centres will need to ensure that learners are fully prepared against any identified areas of weakness before resitting the assessment.

Administrative arrangements for external assessment

Access arrangements requests

Access arrangements are agreed with Pearson before an assessment. They allow learners with special educational needs, disabilities or temporary injuries to:

- access the assessment
- show what they know and can do without changing the demands of the assessment.

Access arrangements should always be processed at the time of registration.

Learners will then know what type of arrangement is in place for them.

Granting reasonable adjustments

For external assessment, a reasonable adjustment is one that Pearson agrees to make for an individual learner. A reasonable adjustment is defined for the individual learner and informed by the list of available access arrangements.

Whether an adjustment will be considered reasonable will depend on a number of factors, including:

- the needs of the learner with the disability
- the effectiveness of the adjustment
- the cost of the adjustment; and
- the likely impact of the adjustment on the learner with the disability and other learners.

Adjustment may be judged unreasonable and not approved if it involves unreasonable costs, timeframes or affects the integrity of the assessment.

Special consideration requests

Special consideration is an adjustment made to a learner's mark or grade after an external assessment to reflect temporary injury, illness or other indisposition at the time of the assessment.

An adjustment is made only if the impact on the learner is such that it is reasonably likely to have had a material effect on that learner being able to demonstrate attainment in the assessment.

Centres are required to notify us promptly of any learners who they believe have been adversely affected and request that we give special consideration. Further information can be found in the special requirements section on our website.

Conducting external assessments

Centres must make arrangement for the secure delivery of external assessments. All centres offering external assessments must comply with the Joint Council for Qualifications (JCQ) document *Instructions for conducting examinations*. The current version of this document is available on our website.

Dealing with malpractice in assessment

Malpractice means acts that undermine the integrity and validity of assessment, the certification of qualifications and/or may damage the authority of those responsible for delivering the assessment and certification.

Pearson does not tolerate actual or attempted actions of malpractice by learners, centre staff or centres in connection with Pearson qualifications. Pearson may impose penalties and/or sanctions on learners, centre staff or centres where malpractice or attempted malpractice has been proven.

Malpractice may occur or be suspected in relation to any unit or type of assessment within a qualification. For further details on malpractice and advice on preventing malpractice by learners, please see Pearson's *Centre Guidance: Dealing with Malpractice*, available on our website.

Centres are required to take steps to prevent malpractice and to investigate instances of suspected malpractice. Learners must be given information that explains what malpractice is for internal assessment and how suspected incidents will be dealt with by the centre. *The Centre Guidance: Dealing with Malpractice* document gives full information on the actions we expect you to take.

Pearson may conduct investigations if we believe a centre is failing to conduct internal assessment according to our policies. The above document gives further information and examples and details the penalties and sanctions that may be imposed.

In the interests of learners and centre staff, centres need to respond effectively and openly to all requests relating to an investigation into an incident of suspected malpractice.

Learner malpractice

The head of centre is required to report incidents of suspected learner malpractice that occur during Pearson qualifications. We ask centres to complete JCQ Form M1 (www.jcq.org.uk/malpractice) and email it with any accompanying documents

(signed statements from the learner, invigilator, copies of evidence, etc) to the Investigations Processing team at candidatemalpractice@pearson.com. The responsibility for determining appropriate sanctions or penalties to be imposed on learners lies with Pearson.

Learners must be informed at the earliest opportunity of the specific allegation and the centre's malpractice policy, including the right of appeal. Learners found guilty of malpractice may be disqualified from the qualification for which they have been entered with Pearson.

Failure to report malpractice constitutes staff or centre malpractice.

Teacher/centre malpractice

The head of centre is required to inform Pearson's Investigations team of any incident of suspected malpractice (which includes maladministration) by centre staff, before any investigation is undertaken. The head of centre is requested to inform the Investigations team by submitting a JCQ M2 Form (downloadable from www.jcq.org.uk/malpractice) with supporting documentation to pqsmalpractice@pearson.com. Where Pearson receives allegations of malpractice from other sources (for example Pearson staff, anonymous informants), the Investigations team will conduct the investigation directly or may ask the head of centre to assist.

Pearson reserves the right in cases of suspected malpractice to withhold the issuing of results/certificates while an investigation is in progress. Depending on the outcome of the investigation, results and/or certificates may not be released, or they may be withheld.

We reserve the right to withhold certification when undertaking investigations, audits and quality assurance processes. You will be notified within a reasonable period of time if this occurs.

Sanctions and appeals

Where malpractice is proven, we may impose sanctions or penalties, such as:

- mark reduction for affected external assessments
- disqualification from the qualification
- debarment from registration for Pearson qualifications for a period of time.

If we are concerned about your centre's quality procedures, we may impose sanctions such as:

- working with centres to create an improvement action plan
- requiring staff members to receive further training
- placing temporary blocks on the centre's certificates
- placing temporary blocks on registration of learners
- debarring staff members or the centre from delivering Pearson qualifications
- suspending or withdrawing centre approval status.

The centre will be notified if any of these apply.

Pearson has established procedures for centres that are considering appeals against penalties and sanctions arising from malpractice. Appeals against a decision made by Pearson will normally be accepted only from the head of centre (on behalf of learners and/or members or staff) and from individual members (in respect of a decision taken against them personally). Further information on appeals can be found in the *JCQ Appeals Booklet* (https://www.jcq.org.uk/exams-office/appeals).

9 Centre recognition and approval

Centres that have not previously offered BTEC Specialist qualifications need to apply for, and be granted, centre recognition as part of the process for approval to offer individual qualifications.

Existing centres will be given 'automatic approval' for a new qualification if they are already approved for a qualification that is being replaced by a new qualification and the conditions for automatic approval are met.

Centres offering mandatory qualifications for the Apprenticeship Standards must be listed on the Education and Skills Funding Agency's Register of Training Organisations and have a contract to deliver these.

Guidance on seeking approval to deliver BTEC qualifications is given on our website.

Approvals agreement

All centres are required to enter into an approval agreement with Pearson, in which the head of centre or principal agrees to meet all the requirements of the qualification specification and to comply with the policies, procedures, codes of practice and regulations of Pearson and relevant regulatory bodies. If centres do not comply with the agreement, this could result in the suspension of certification or withdrawal of centre or qualification approval.

10 Unit

This section explains how the unit is structured. It is important that all tutors, assessors, internal verifiers and other staff responsible for the programme review this section.

The unit has the following sections.

Unit number

The number of the unit in the sequence shown in the specification.

Unit title

This is the formal title of the unit that will appear on the learner's certificate.

Level

The unit and the qualification have a level assigned to them. The level assigned is informed by the level descriptors defined by Ofqual, the qualifications regulator.

Guided Learning Hours (GLH)

This indicates the number of hours of activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, for example lectures, tutorials, online instruction and supervised study.

Pearson has consulted with users of the qualification and has assigned a number of hours to this activity for the unit.

Unit introduction

This is designed with learners in mind. It indicates why the unit is important, what will be learned and how the learning might be applied in the workplace.

Learning outcomes

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

Assessment criteria

The assessment criteria specify the standard the learner is required to meet to achieve a learning outcome.

Unit content

This section sets out the required teaching content of the unit and specifies the knowledge and understanding required for achievement of the unit. It enables centres to design and deliver a programme of learning that will enable learners to achieve each learning outcome and to meet the standard determined by the assessment criteria.

Where it is designed to support apprenticeships, the unit content is informed by the knowledge and understanding requirements of the relevant Apprenticeship Standard.

Relationship between unit content and assessment criteria

The content in the unit is mandatory for assessment and will be sampled across different versions of the assessment over time. Learners can be tested on any aspect of the content.

Legislation

Legislation cited in the unit is current at time of publication. The most recent legislation should be taught and assessed internally. External assessments will use the most recent legislation.

Essential information for tutors and assessors

This section gives information to support delivery and the implementation of assessment. It contains the following subsections.

- *Essential resources* – lists any specialist resources needed to deliver the unit. The centre will be asked to make sure that these resources are in place when it seeks approval from Pearson to offer the qualification.
- *Assessment* – this section gives details of the format, structure and any specific conditions of the external assessment.

Unit 1: Software Development Methodologies

Level: 4

Guided learning hours: 90

Unit introduction

In this unit, you will gain an understanding of how software is developed and the stages that must be followed to develop software.

The primary role of a software developer is to design, create, test and implement code for a variety of platforms. A software developer helps organisations in a range of industries to meet their business needs by developing effective, efficient, robust and often innovative applications. Most industries are increasingly reliant on digital platforms and understanding why, how and when code for these platforms should be created or updated is a key aspect of the role.

You will gain an understanding of the common developmental processes used in the computing industry, including software development life cycles and development methodologies. You will also gain understanding of the importance of having effective software development teams.

Learning outcomes and assessment criteria

To pass this unit, the learner 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.

Learning outcomes		Assessment criteria	
1	Understand the software development life cycle (SDLC)	1.1	Identify the benefits of utilising the software development life cycle
		1.2	Describe the steps involved during each stage of the software development life cycle
2	Understand the development methodologies used when developing software and their similarities and differences	2.1	Describe the processes within each phase of agile software development methodology
		2.2	Explain the strengths of agile development methodology
		2.3	Explain the weaknesses of agile development methodology
		2.4	Describe the processes within each phase of waterfall software development methodology
		2.5	Explain the strengths of waterfall development methodology
		2.6	Explain the weaknesses of waterfall development methodology
3	Understand how teams work effectively to produce software	3.1	Describe project roles and tasks performed in the software development team
		3.2	Describe how to set up a software development team
		3.3	Explain how effective project teamwork contributes to the delivery of software development projects

Unit content

What needs to be learned
Learning outcome 1: Understand the software development life cycle (SDLC)

Identify the benefits of utilising the software development life cycle

- An industry standard framework for software development.
- Offers a structured approach with clearly defined roles and responsibilities.
- A timeline for software development with clearly defined phases.
- Clearly-defined inputs and outputs from one step to the next.
- A common vocabulary at each step.
- Defined communication channels between development teams and stakeholders.
- Clear documentation requirements and audit trails.

Describe the steps involved during each stage of the software development life cycle

Feasibility, planning and requirement analysis:

- ascertain application goals
- choose programming language based on
    - organisational policy
    - expandability
    - availability of trained staff
    - costs
    - reliability
    - software compatibility.
- producing documentation
    - software configuration management plan
    - software quality assurance plan
    - project plan
    - resource allocation
    - cost estimation.

Defining requirements:

- producing documentation
    - requirements specification

What needs to be learned

- updated project plan
- requirements traceability matrix (RTM)

- carry out research
  - questionnaires
  - interviews
  - focus groups
  - observations
  - studying documentation.

Designing the product:

- producing design documentation
  - interface design
  - wireframes
  - mood boards
  - storyboards
  - assets list
  - security considerations
  - proof of concept
  - algorithm design
  - flow charts
  - pseudocode
  - hardware compatibility
  - operating systems compatibility
- updating project plan
- updating design elements of requirements traceability matrix (RTM).

Developing the product:

- building the product
  - implementing software code
  - implementing map
- creating product documentation
  - software help manual
  - test plan

What needs to be learned
○ updated project plan ○ updated development elements of requirements traceability matrix (RTM) • prototyping ○ determining basic requirements ○ producing initial prototype ○ reviewing prototype ○ revising and enhancing prototype. Testing the product: • carrying out testing (non-functional) ○ availability testing ○ compatibility testing ○ configuration testing ○ load testing • carrying out testing (functional) ○ unit testing ○ smoke testing ○ integration testing ○ system testing • documenting the test results • updating project plan • updating software help manual • updating implementation map • updating software code • creating acceptance plan. Implementing the product: • install and configure the product • carry out acceptance testing • obtain client acceptance. Maintenance: • provide software support • provide user support.

What needs to be learned

Learning outcome 2: Understand the development methodologies used when developing software and their similarities and differences

Describe the processes within each phase of agile software development methodology

Scoping and prioritising projects:

- project definition
- duration of project
- business case
- feasibility
- scope of work and resources required.

Gathering requirements for initial sprint:

- stakeholder meetings
- project requirements
- scheduling and project timeline
- select team
- allocate resources
- define responsibilities
- design documentation

Construction and iteration:

- produce first iteration of product (working product containing minimum features)
- client feedback
- release iteration into production
- product testing
- fault fixing
- product enhancement/development
- user documentation and instructions
- release current iteration.

Production and ongoing support:

- bug fixing
- user training

What needs to be learned

- product enhancement.

Retirement:

- identify retirement criteria (redundancy, obsolescence, change of business priority)
- remove or retire digital product
- introduce replacement.

Explain the strengths of agile development methodology

- Customer satisfaction by rapid, continuous delivery of useful software.
- People and interactions are emphasised rather than process and tools – customers, developers and testers constantly interact with each other.
- Working software is delivered frequently (weeks rather than months).
- Close, daily cooperation between business people and developers.
- Continuous attention to technical excellence and good design.
- Regular adaptation to changing circumstances.

Explain the weaknesses of agile development methodology

- difficult to assess the effort required for large software developments.
- lack of emphasis on necessary designing and documentation.
- project can easily get taken off track if the customer representative is not clear what outcome that they want.
- only senior programmers can take the kind of decisions required during the development process.

Describe the processes within each phase of waterfall software development methodology

Requirements specification:

- understand problem
    - problem definition
    - client requirements ('as is' and 'to be')
- investigate and analyse.

Design:

- functional and non-functional elements
- user interface
- design specification.

What needs to be learned

Create solution:

- develop software in small programs called units.

Testing (each unit and the system is tested):

- debug and test
  - functional testing
  - non-functional testing
  - interface testing
  - fixing bugs.

Deployment and maintenance:

- service management phase
  - deploy
  - operate
  - refine
- application management
  - monitor
  - optimise.

Explain the strengths of waterfall development methodology

- Easy to project manage due to the rigidity of the model.
- Each phase has specific deliverables and a review process.
- Phases do not overlap which allows easier management of resources.
- Works well for smaller projects where requirements are clearly defined and very well understood.

Explain the weaknesses of waterfall development methodology

- Once an application is in the testing stage, it is very difficult to go back and change something that was not well thought out in the concept stage.
- No working software is produced until late during the life cycle.
- High amounts of risk and uncertainty.
- Not suitable for complex projects.
- No prototypes produced.

What needs to be learned

Learning outcome 3: Understand how teams work effectively to produce software

Describe project roles and tasks performed in the software development team

Business analyst:

- role (investigates, analyses and documents the business processes of an organisation to help define requirements of business)
- tasks (feasibility study, business requirements analysis, business requirements definition, business case).

Requirements engineer:

- role (defines, documents and maintains the IT requirements of an organisation based on the identified business requirements)
- tasks (IT requirements analysis, analyse current trends, liaise with client and other stakeholders, defines the IT requirements of an organisation, defines the goals of a proposed IT system).

Software designer:

- role (applies principles of computer science and mathematics to define and plan solutions to problems)
- tasks (decomposes problems, designs algorithms to solve problems, defines program specifications, produces visual and logical designs).

Software developer:

- role (creates program code and associated assets in order to implement the planned solution as a functioning software application)
- tasks (problem solving, creates program code, integrates systems, software maintenance, updates development logs).

Software tester:

- role (plans and implements methodologies to ensure software is functional, secure and meets specified business requirements)
- tasks (produce test plans, devise tests to ensure all requirements are met, identify test users, collate and interpret feedback, interpret log and performance data).

Software project manager:

- role (oversees software development projects, plans and assigns resources to ensure projects meet time, cost and quality requirements)
- tasks (resource planning, time management, analyse and manage risk, cost–benefit analysis, budget control).

What needs to be learned

Software release engineer:

- role (aids quality assurance by working on build of the final package, release and deployment (installation) of the finished application)
- tasks (deploy/install software, package builds, manage version control, monitor and review installed software, identify and resolve issues with installed software).

Describe how to set up a software development team

Define the size of the team:

- larger teams require additional communication channels
- create small, cross-functional independent teams each led by a team lead.

Choose the team type:

- generalist
  - possesses a wide range of knowledge and skills and can apply their competence across a vast range of areas within their expertise
  - can utilise a variety of different resources, perform different tasks, often has stronger communication skills and the ability to quickly acquire new knowledge
- specialist
  - has a specific set of skills and techniques or a preferred single methodology
  - possesses a high level of expertise and the ability to use this methodology while solving complicated business problems in areas where greater attention is demanded
- hybrid
  - mix of both generalist and specialist
  - will focus specifically on areas where project needs the most work and will handle additional tasks if the need arises.

Document responsibilities:

- roles of the developers
- important goals to work on
- resources needed.

Choose management style:

- strict
- self-organisation.

What needs to be learned

Explain how effective project teamwork contributes to the delivery of software development projects

Factors that affect team dynamics:

- Tuckman's stages of group development
  - forming
  - storming
  - norming
  - performing
  - adjourning
- attitudes
  - decision making
  - interpersonal interactions
  - performance, productivity
- loyalty to a specific person/group
  - recognising poor practice
  - reporting concerns
- competition among colleagues
  - positive
  - innovation
  - motivation
    - negative
    - creates tension
    - frustration
- professional behaviour
  - respect of others
  - commitment to quality
  - responsibility
  - accountability
  - personal appearance
- punctuality
  - managing own time

What needs to be learned

- working within time limits
- cooperation
  - mutual benefit
- conflict management
  - accommodating
  - avoiding
  - compromising.

Communication skills:

- non-verbal communication (body language, eye contact, hand gestures)
- active listening
- clarity
- concision
- confidence
- empathy.

Importance of teamwork:

- achieving project objectives
- camaraderie
- motivates unity in the workplace
- offers different perspective and feedback
- improves efficiency and productivity
- learning opportunities
- promotes workplace synergy.

Essential information for tutors and assessors

Essential resources

There are no special resources needed for this unit.

Assessment

This section must be read in conjunction with *Section 8 Assessment*.

This unit is externally assessed through an onscreen test, which is set and marked by Pearson. The test lasts for 1 hour and is worth 30 marks. The assessment is available on demand.

The test assesses all of the learning outcomes. The questions in the test are based on each assessment criterion and its associated unit content.

The test consists of multiple-choice items.

Items in the test will not necessarily be sequenced in the order of the criteria in the unit. Test items will not rely on or directly follow on from another test item. Test items may use colour images/diagrams/graphs for the context of the question or for the answer options.

A Pass grade is determined by learners achieving a defined cut score for the test.

11 Suggested teaching resources

This section lists resource materials that can be used to support the delivery of the unit across the qualification.

Textbooks

Ahmed A, Elshaikh E – *A Comparative Study of Software Development Methodologies; Traditional Software Engineering and Agile Software Development Methodologies* (Lambert Academic Publishing, 2014) ISBN 9783659308178

Cockburn A – *Agile Software Development: The Cooperative Game* (Addison-Wesley Professional, 2006) ISBN 9780321482754

Hayes H – *Agile Project Management: The Ultimate Guide To Agile Project Management And Software Development – Plus Tips & Tricks For Implementing Scrum! (Agile Project Management, Agile Development, Scrum)* CreateSpace Independent Publishing Platform, 2016) ISBN 9781540315380

Jones C – *Software Methodologies: A Quantitative Guide* (Auerbach Publications, 2017) ISBN 9781138033085

12 Further information and useful publications

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

  Edexcel, BTEC and Pearson Work Based Learning contact details: qualifications.pearson.com/en/support/contact-us.html.
- Books, software and online resources for UK schools and colleges: www.pearsonschoolsandfecolleges.co.uk.

Key publications

- *Access arrangements and reasonable adjustments* (Joint Council for Qualifications (JCQ))
- *A guide to recruiting learners onto Pearson qualifications* (Pearson)
- *A guide to the special consideration process* (JCQ)
- *Guide to BTEC UK Quality Assurance* (Pearson)
- *Collaborative and consortium arrangements for the delivery of vocational qualifications policy* (Pearson)
- *Enquiries and appeals about Pearson vocational qualifications and end point assessment policy* (Pearson)
- *Equality, diversity and inclusion policy* (Pearson)
- *Guidance for reasonable adjustments and special consideration in vocational internally assessed units* (Pearson)
- *Suspected malpractice in examinations and assessments – Policies and procedures* (JCQ)
- *UK Information Manual* (Pearson)
- *Use of languages in qualifications policy* (Pearson).

All of these publications are available on our website.

Publications on the quality assurance of BTEC qualifications are also available on our website.

Our publications catalogue lists all the material available to support our qualifications. To access the catalogue and order publications, please visit our website.

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.

13 Professional development and training

Pearson supports UK and international customers with training related to BTEC qualifications. This support is available through a choice of training options offered on our website.

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. 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 our website.

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
- Ask the Expert: submit your question online to our Ask the Expert online service and we will make sure your query is handled by a subject specialist.

Please visit our website at qualifications.pearson.com/en/support/contact-us.html

February 2020

For information about Pearson Qualifications, including Pearson Edexcel, BTEC and LCCI qualifications visit qualifications.pearson.com

Pearson Education Limited. Registered in England and Wales No. 872828
Registered Office: 80 Strand, London WC2R 0RL.

VAT Reg No GB 278 537121