

# **Level 3 Advanced Technical Certificate in Digital Technologies (5220-30)**

**May 2019 Version 3.1**

**Qualification Handbook**

## Qualification at a glance

<b>Industry area</b>	Digital
<b>City &amp; Guilds qualification number</b>	5220-30
<b>Age group</b>	16-19 (Key Stage 5), 19+
<b>Entry requirements</b>	Centres must ensure that any pre-requisites stated in the <i>What is this qualification about?</i> section are met.
<b>Assessment</b>	<p>To gain this qualification, candidates must successfully achieve the following assessments:</p> <ul style="list-style-type: none"> <li>• One externally set, externally moderated assignment</li> <li>• One externally set, externally marked exam, sat under examination conditions</li> </ul>
<b>Additional requirements to gain this qualification</b>	Employer involvement in the delivery and/or assessment of this qualification is essential for all candidates and will be externally quality assured.
<b>Grading</b>	<p>This qualification is graded Pass/Merit/Distinction/Distinction*</p> <p>For more information on grading, please see Section 7: Grading.</p>
<b>Approvals</b>	This qualification requires full centre and qualification approval
<b>Support materials</b>	<p>Sample assessments</p> <p>Guidance for delivery</p> <p>Guidance on use of marking grids</p>
<b>Registration and certification</b>	Registration and certification of this qualification is through the Walled Garden, and is subject to end dates.
<b>External quality assurance</b>	This qualification is externally quality assured by City & Guilds, and its internally marked assignments are subject to external moderation. There is no direct claim status available for this qualification.

Title and level	Size (GLH)	TQT	City & Guilds qualification number	Ofqual accreditation number
Level 3 Advanced Technical Certificate in Digital Technologies	360	600	5220-30	601/4513/4

Version and date	Change detail	Section
1.1 May 2016	Small typographical errors	Throughout
	TQT added for qualifications	1. Introduction
	Assessment component titles amended	
	Employer involvement guidance updated throughout	4. Employer involvement
	Summary of assessment methods and conditions	5. Assessment
	Moderation and standardisation of assessment updated throughout	6. Moderation and standardisation of assessment
	Awarding individual assessments	7. Grading
	Awarding grades and reporting results	
	Enquiries about results	8. Administration
	Re-sits and shelf-life of assessment results	
	Malpractice	
	Access arrangements and special consideration	
2.0 May 2017	External theory test revised with updated coverage	5 Assessment
	Assessment Objectives 06 – 08 removed from synoptic assignment coverage and weightings updated	
	Branding Changes	City and Guilds Logo
3.0 May 2017	Exam coverage updated	5 Assessment
3.1 May 2019	Wording changed regarding retakes	5. Assessment – Summary of assessment methods and conditions 8. Administration – Re-sits and shelf-life of assessment results

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# 1 Introduction

## What is this qualification about?

The following purpose statement relates to the **Level 3 Advanced Technical Certificate in Digital Technologies (5220-30)**.

Area	Description
OVERVIEW	
Who is this qualification for?	This qualification is for you if you are 16 or over and want to develop your knowledge and skills in digital technology as well as applying these to practical situations. It will provide you with a step on to the Digital Industries Apprenticeships or into a computing degree programme.
What does this qualification cover?	<p>The Level 3 Technical Certificate in Digital Technology will support you to develop a broad and comprehensive understanding of the IT digital environment covering seven compulsory topics:</p> <ul style="list-style-type: none"><li>• project management</li><li>• information security</li><li>• networking fundamentals</li><li>• digital business communication</li><li>• software development fundamentals</li><li>• collection and analysis of data</li><li>• enterprise technologies.</li></ul> <p>Centres and providers work with local employers who will contribute to the knowledge and delivery of training. Employers will provide demonstrations and talks on the industry and where possible work placements will also be provided by the employers. This practically based training is ideal preparation for gaining employment in the digital industry or specialist further study.</p>
WHAT COULD THIS QUALIFICATION LEAD TO?	
Will the qualification lead to employment, and if so, in which job role and at what level?	<p>The qualification can provide you with an opportunity to join an organisation in a junior role such as:</p> <ul style="list-style-type: none"><li>• trainee network administrator</li><li>• trainee systems administrator.</li></ul>
Why choose this qualification over similar qualifications?	This qualification is for you if want an introductory qualification to develop the basic skills and knowledge required by employers in the Digital Technologies industry. This will typically be delivered over one year alongside other qualifications in the same area or as part of a wider programme of study.

	<p>If you are looking for a two year course to be taken alongside other qualifications and are hoping to specialise by developing the skills and knowledge in one of the six key technology areas then the Level 3 Advanced Technical Extended Diploma in Digital Technologies would be more appropriate.</p>
Will the qualification lead to further learning?	<p>Yes, with this qualification you can explore higher level Apprenticeships such as the Level 4 Higher Apprenticeship for IT, Software, Web &amp; Telecoms Professionals or the Level 4 Higher Apprenticeship in Information Security. As this qualification has UCAS points you could also use this to progress to degrees in areas such as Computing, Digital Marketing and Business.</p>
WHO SUPPORTS THIS QUALIFICATION?	
Employer/Higher Education Institutions	<p>Microsoft Cisco CompTIA IBM Forge Rock</p>

## Qualification structure

For the **Level 3 Advanced Technical Certificate in Digital Technologies** the teaching programme must cover the content detailed in the structure below:

Unit number	Unit title	GLH
<b>Mandatory</b>		
301	Project management	30
302	Information security	60
303	Networking fundamentals	60
304	Digital business communication	60
305	Software development fundamentals	60
306	Collection and analysis of data	60
307	Enterprise technologies	30

## Total qualification time (TQT)

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

Title and level	GLH	TQT
Level 3 Advanced Technical Certificate in Digital Technologies	360	600



## Assessment requirements and employer involvement

To achieve the **Level 3 Advanced Technical Certificate in Digital Technologies** candidates must successfully complete **both** the mandatory assessment components.

Component number	Title
<b>Mandatory</b>	
031	Level 3 Digital Technologies - Synoptic assignment (1)*
030 (or 530)	Level 3 Digital Technologies - Theory exam (1)*

In addition, candidates **must** achieve the mandatory employer involvement requirement for this qualification **before** they can be awarded a qualification grade. For more information, please see guidance in *Section 4: Employer involvement*.

### Employer involvement

Component number	Title
<b>Mandatory</b>	
830	Employer involvement

*\*Number of mandatory assessments per assessment type*

## 2 Centre requirements

### Approval

New centres will need to gain centre approval. Existing centres who wish to offer this qualification must go through City & Guilds' **full** Qualification Approval Process. There is no fast track approval for this qualification. Please refer to the City & Guilds website for further information on the approval process: [www.cityandguilds.com](http://www.cityandguilds.com)

### Resource requirements

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

### Centre staffing

Staff delivering these qualifications must be able to demonstrate that they meet the following requirements:

- be technically competent in the areas in which they are delivering
- be able to deliver across the breadth and depth of the content of the qualification being taught
- have recent relevant teaching and assessment experience in the specific area they will be teaching, or be working towards this
- demonstrate continuing CPD

### Physical resources

Centres must be able to demonstrate that they have access to the equipment and technical resources required to deliver this qualification and its assessment.

### Internal Quality Assurance

Internal quality assurance is key to ensuring accuracy and consistency of tutors and markers. Internal Quality Assurers (IQAs) monitor the work of all tutors involved with a qualification to ensure they are applying standards consistently throughout assessment activities. IQAs must have, and maintain, an appropriate level of technical competence and be qualified to make both marking and quality assurance decisions through a teaching qualification or recent, relevant experience.

### Entry requirements

Centres must ensure that all learners have the opportunity to gain the qualification through appropriate study and training, and that any prerequisites stated in the *What is this qualification about?* section are met when registering on this qualification.

### Age restrictions

This qualification is approved for learners aged 16 – 19, 19+.

## 3 Delivering technical qualifications

### Initial assessment and induction

An initial assessment of each learner should be made before the start of their programme to identify:

- if the learner has any specific learning or training needs,
- support and guidance they may need when working towards their qualification,
- the appropriate type and level of qualification.

We recommend that centres provide an introduction so that learners fully understand the requirements of the qualification, their responsibilities as a learner, and the responsibilities of the centre. This information can be recorded on a learning contract.

### Employer involvement

Employer involvement is essential to maximise the value of each learner's experience. Centres are required to involve employers in the delivery of technical qualifications at Key Stage 5 and/or their assessment, for every learner. This must be in place or planned before delivery programmes begin in order to gain qualification approval. See *Section 4: Employer involvement* for more detail.

### Support materials

The following resources are available for this qualification:

Description	How to access
Sample assessments	
Guidance for delivery	Available 2016 on the qualification pages on the City & Guilds Website: <b><a href="http://www.cityandguilds.com">www.cityandguilds.com</a></b>
Guidance on use of marking grids	

## 4 Employer involvement

Employer involvement is a formal component of Key Stage 5 Technical qualifications. It does not contribute to the overall qualification grading, but is a mandatory requirement that all learners must meet. As such it is subject to external quality assurance by City & Guilds.

Department for Education (DfE) requirements state:

*Employer involvement in the delivery and/or assessment of technical qualifications provides a clear 'line of sight' to work, enriches learning, raises the credibility of the qualification in the eyes of employers, parents and students and furthers collaboration between the learning and skills sector and industry.*

*[Technical qualifications] must:*

- *require all students to undertake meaningful activity involving employers during their study; and*
- *be governed by quality assurance procedures run by the awarding organisation to confirm that education providers have secured employer involvement for every student*

Extract from: **Vocational qualifications for 16 to 19 year olds, 2017 and 2018 performance tables: technical guidance for awarding organisations, paragraphs 89-90**

City & Guilds will provide support guidance and quality assurance of employer involvement.

### Qualification approval

To be approved to offer City & Guilds technicals, centres must provide an Employer Involvement planner and tracker showing how every learner will be able to experience meaningful employer involvement, and from where sufficient and suitable employer representatives are expected to be sourced.

Centres must include in their planner a sufficient range of activities throughout the learning programme that provide a range of employer interactions for learners. Centres must also plan contingencies for learners who may be absent for employer involvement activities, so that they are not disadvantaged.

As part of the approval process, City & Guilds will review this planner and tracker. Centres which cannot show sufficient commitment from employers and/or a credible planner and tracker will be given an action for improvement with a realistic timescale for completion. **Approval will not be given** if employer involvement cannot be assured either at the start of the qualification, or through an appropriate plan of action to address this requirement before the learner is certificated.

### Monitoring and reporting learner engagement

Employer involvement is a formal component of this qualification and is subject to quality assurance monitoring. Centres must record evidence that demonstrates that each learner has been involved in meaningful employer based activities against the mandatory content before claiming the employer involvement component for learners.

Centres must record the range and type of employer involvement each learner has experienced and submit confirmation that all learners have met the requirements to City & Guilds. If a centre cannot

provide evidence that learners have met the requirements to achieve the component, then the learner will not be able to achieve the overall Technical Qualification.

## Types of involvement

Centres should note that to be eligible, employer involvement activities **must** relate to one or more elements of the mandatory content of this qualification.

As the aim of employer involvement is to enrich learning and to give learners a taste of the expectations of employers in the industry area they are studying, centres are encouraged to work creatively with local employers.

Employers can identify the areas of skills and knowledge in their particular industry that they would wish to see emphasised for learners who may apply to work with them in the future. Centres and employers can then establish the type of input, and which employer representative might be able to best support these aims.

To be of most benefit this must add to, rather than replace the centre's programme of learning. Some examples of meaningful employer involvement are listed below. Employer involvement not related to the mandatory element of the qualification, although valuable in other ways, does not count towards this element of the qualification.

**The DfE has provided the following examples of what does and does not count as meaningful employer involvement, as follows<sup>1,2</sup>:**

### ***The following activities meet the requirement for meaningful employer involvement:***

- *students undertake structured work-experience or work-placements that develop skills and knowledge relevant to the qualification<sup>3</sup>;*
- *students undertake project(s), exercises(s) and/or assessments/examination(s) set with input from industry practitioner(s);*
- *students take one or more units delivered or co-delivered by an industry practitioner(s). This could take the form of master classes or guest lectures;*
- *industry practitioners operate as 'expert witnesses' that contribute to the assessment of a student's work or practice, operating within a specified assessment framework. This may be a specific project(s), exercise(s) or examination(s), or all assessments for a qualification.*

*In all cases participating industry practitioners and employers must be relevant to the industry sector or occupation/occupational group to which the qualification relates.*

### ***The following activities, whilst valuable, do not meet the requirement for meaningful employer involvement:***

- *employers' or industry practitioners' input to the initial design and content of a qualification;*
- *employers hosting visits, providing premises, facilities or equipment;*
- *employers or industry practitioners providing talks or contributing to delivery on employability, general careers advice, CV writing, interview training etc;*
- *student attendance at career fairs, events or other networking opportunities;*
- *simulated or provider-based working environments eg hairdressing salons, florists, restaurants, travel agents, small manufacturing units, car servicing facilities;*

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<sup>1</sup> As extracted from: Vocational qualifications for 16 to 19 year olds  
2017 and 2018 performance tables: technical guidance for awarding organisations

<sup>2</sup> This list has been informed by a call for examples of good practice in employer involvement in the delivery and assessment of technical qualifications - **Employer involvement in the delivery and assessment of vocational qualifications**

<sup>3</sup> **DfE work experience guidance**

- *employers providing students with job references.*

### **Types of evidence**

For each employer involvement activity, centres are required to provide evidence of which learners undertook it, e.g. a candidate attendance register. The types of additional evidence required to support a claim for this component will vary depending on the nature of the involvement. E.g. for a guest lecture it is expected that a synopsis of the lecture and register would be taken which each learner and the guest speaker will have signed; expert witnesses will be identified and will have signed the relevant assessment paperwork for each learner they have been involved in assessing; evidence of contribution from employers to the development of locally set or adapted assignments.

### **Quality assurance process**

As the employer involvement component is a requirement for achieving the KS5 Technical qualifications, it is subject to external quality assurance by City & Guilds at the approval stage and when centres wish to claim certification for learners.

Evidence will be validated by City & Guilds before learners can achieve the employer involvement component. Where employer involvement is not judged to be sufficient, certificates cannot be claimed for learners.

### **Sufficiency of involvement for each learner**

It is expected that the centre will plan a range of activities that provide sufficient opportunities for each learner to interact directly with a range of individuals employed in the related industry. Centres must also provide contingencies for learners who may be absent for part of their teaching, so they are not disadvantaged. Any absence that results in a learner missing arranged activities must be documented. Where learners are unable to undertake all employer involvement activities due to temporary illness, temporary injury or other indisposition, centres should contact City & Guilds for further guidance.

### **Live involvement**

Learners will gain most benefit from direct interaction with employers and/or their staff; however the use of technology (e.g. the use of live webinars) is encouraged to maximise the range of interactions. Where learners are able to interact in real time with employers, including through the use of technology, this will be classed as 'live involvement'.

It is considered good practice to record learning activities, where possible, to allow learners to revisit their experience and to provide a contingency for absent learners. This is not classed as live involvement however, and any involvement of this type for a learner must be identified as contingency.

### **Timing**

A learner who has not met the minimum requirements cannot be awarded the component, and will therefore not achieve the qualification. It is therefore important that centres give consideration to scheduling employer involvement activities, and that enough time is allotted throughout delivery and assessment of the qualification to ensure that requirements are fully met.

## 5 Assessment

### Summary of assessment methods and conditions

Component numbers	Assessment method	Description and conditions
031	Synoptic assignment	<p>The synoptic assignment is <b>externally set, internally marked and externally moderated</b>. The assignment requires candidates to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories, and knowledge from across the content area. Candidates will be judged against the assessment objectives.</p> <p>Assignments will be released to centres as per dates indicated in the Assessment and Examination timetable published on our website.</p> <p>Centres will be required to maintain the security of all live assessment materials. Assignments will be password protected and released to centres through a secure method.</p> <p>There will be one opportunity within each academic year to sit the assignment. Candidates who fail the assignment will have one re-sit opportunity. The re-sit opportunity will be in the next academic year, and will be the assignment set for that academic year once released to centres. If the re-sit is failed, the candidate will fail the qualification.</p> <p>Please note that for externally set assignments City &amp; Guilds provides guidance and support to centres on the marking and moderation process.</p>
030 (or 530)	Externally marked exam	<p>The exam is <b>externally set and externally marked</b>, and will be taken online through City &amp; Guilds' computer-based testing platform.</p> <p>The exam is designed to assess the candidate's depth and breadth of understanding across content in the qualification at the end of the period of learning, using a range of question types and will be sat under invigilated examination conditions. See JCQ requirements for details: <a href="http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations">http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations</a></p> <p>The exam specification shows the coverage of the exam across the qualification content.</p> <p>Candidates who fail the exam at the first sitting will have a maximum of two opportunities to retake. If the candidate fails the exam three times then they will fail the qualification. (Note: the third and final retake opportunity applies to Level 3 only.) For exam dates, please refer to the Assessment and Examination timetable.</p>
830	Portfolio of evidence	<p>These units will be assessed by a portfolio of evidence, externally moderated by City &amp; Guilds.</p>

## **What is synoptic assessment?**

Technical qualifications are based around the development of a toolkit of knowledge, understanding and skills that an individual needs in order to have the capability to work in a particular industry or occupational area. Individuals in all technical areas are expected to be able to apply their knowledge, understanding and skills in decision making to solve problems and achieve given outcomes independently and confidently.

City & Guilds technical qualifications require candidates to draw together their learning from across the qualification to solve problems or achieve specific outcomes by explicitly assessing this through the synoptic assignment component.

In this externally set, internally marked and externally moderated assessment the focus is on bringing together, selecting and applying learning from across the qualification rather than demonstrating achievement against units or subsets of the qualification content. The candidate will be given an appropriately levelled, substantial, occupationally relevant problem to solve or outcome to achieve. For example this might be in the form of a briefing from a client, leaving the candidate with the scope to select and carry out the processes required to achieve the client's wishes, as they would in the workplace.

Candidates will be marked against assessment objectives (AOs) such as their breadth and accuracy of knowledge, understanding of concepts, and the quality of their technical skills as well as their ability to use what they have learned in an integrated way to achieve a considered and high quality outcome.

## **How the assignment is synoptic for this qualification**

The typical assignment brief could be to prepare and complete an IT project, including designing and creating a programme, preparing a project plan, setting up and testing a network, review of the project and investigating the promotion of the project on social media.

This will require the candidate to draw from across the content of the qualification to ensure that the tasks are completed effectively.

## **External exam for stretch, challenge and integration**

The external assessment will draw from across the full content of the qualification, using a range of shorter questions to confirm breadth of knowledge and understanding while also using extended response questions to go into more depth, giving candidates the opportunity to demonstrate higher level understanding and integration through discussion, analysis and evaluation, and ensuring the assessment can differentiate between 'just able' and higher achieving candidates.



## Assessment objectives

The assessments for this qualification are set against a set of assessment objectives (AOs) which are used across all City & Guilds Technicals to promote consistency among qualifications of a similar purpose. They are designed to allow judgement of the candidate to be made across a number of different categories of performance.

Each assessment for the qualification has been allocated a set number of marks against these AOs based on weightings recommended by stakeholders of the qualification. This mark allocation remains the same for all versions of the assessments, ensuring consistency across assessment versions and over time.

The following table explains all AOs in detail, including weightings for the synoptic assignments. In some cases, due to the nature of a qualification's content, it is not appropriate to award marks for some AOs. Weightings for exams (AOs 1, 2 and 4 only) can be found with the exam specification.

Assessment objective	Level 3 Advanced Technical Certificate in Digital Technologies Typical expected evidence of knowledge, understanding and skills	Approximate weighting
<b>A01</b> Recalls knowledge from across the breadth of the qualification.	Relevant legislation, media file types, available database software	5%
<b>A02</b> Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	Gathering and presenting data including data patterns and legislation	15%
<b>A03</b> Demonstrates technical skills from across the breadth of the qualification.	Database creation, chart creation, use of media file types, website creation, website navigation, use of language, copyright compliance, web browser functionality. Image relevance and originality, webpage aesthetics and layout and text quality of language.	40%
<b>A04</b> Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	Bringing primary and secondary research together, website structure and content, evaluation of processes, learner navigation systems	30%
<b>A05</b> Demonstrates perseverance in achieving high standards and attention to detail while showing an understanding of wider impact of their actions.	Database structure, database fields, reporting structure, language to include tone of voice, media file type preparation. This would also include examples of evaluation such as data patterns, consideration of the processes	10%

## Exam specification

AO weightings per exam

AO	Component 030 weighting (approx. %)
AO1 Recalls knowledge from across the breadth of the qualification.	20
AO2 Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	60
AO4 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	20

The way the exam covers the content of the qualification is laid out in the table below:

**Assessment type:** Examiner marked, written exam usually delivered online \*

**Assessment conditions:** Invigilated examination conditions

**Grading:** X/P/M/D

030/530	Duration: 2 hours 40 minutes		
Unit number	Unit title	Number of marks	%
301	Project management	6	7.5
302	Information security	18	22.5
303	Networking fundamentals	18	22.5
305	Software development fundamentals	20	25
NA	Stretch and integrated question	18	22.5
<b>Total</b>		<b>80</b>	<b>100</b>

\*These exams are sat under invigilated examination conditions, as defined by the JCQ:

<http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations>

Entry for exams can be made through the City & Guilds Walled Garden.

## 6 Moderation and standardisation of assessment

City & Guilds' externally set assignments for technical qualifications are designed to draw from across the qualifications' content, and to contribute a significant proportion towards the learner's final qualification grade. They are subject to a rigorous external quality assurance process known as external moderation. This process is outlined below. For more detailed information, please refer to 'Marking and moderation - Technicals centre guidance' available to download on the City & Guilds website.

It is vital that centres familiarise themselves with this process, and how it impacts on their delivery plan within the academic year.

### **Supervision and authentication of internally assessed work**

The Head of Centre is responsible for ensuring that internally assessed work is conducted in accordance with City & Guilds' requirements.

City & Guilds requires both tutors and candidates to sign declarations of authenticity. If the tutor is unable to sign the authentication statement for a particular candidate, then the candidate's work cannot be accepted for assessment.

### **Internal standardisation**

For internally marked work<sup>4</sup> the centre is required to conduct internal standardisation to ensure that all work at the centre has been marked to the same standard. It is the Internal Quality Assurer's (IQA's) responsibility to ensure that standardisation has taken place, and that the training includes the use of reference and archive materials such as work from previous years as appropriate.

### **Provision for reworking evidence after submission for marking by the tutor**

It is expected that in many cases a candidate who is struggling with a specific piece of work may themselves choose to restart and rectify the situation during their normal allocated time, and before it gets to the stage of it being handed in for final marking by the tutor.

In exceptional circumstances however, where a candidate has completed the assignment in the required timescales, and has handed it in for marking by the tutor but is judged to have significantly underperformed, may be allowed to rework or supplement their original evidence for remarking prior to submission for moderation. For this to be allowed, the centre must be confident that the candidate will be able to improve their performance without additional feedback from their tutor and within the required timescales ie the candidate has shown they can perform sufficiently better previously in formative assessments.

The reworked and/or supplemented original evidence must be remarked by the tutor in advance of the original moderation deadline and the moderator informed of any candidates who have been allowed to resubmit evidence.

The process must be managed through the IQA. The justification for allowing a resubmission should be recorded and made available on request. The use of this provision will be monitored by City & Guilds.

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<sup>4</sup> For any internally assessed optional unit assignments, the same process must be followed where assessors must standardise their interpretation of the assessment and grading criteria.

## Internal appeal

Centres must have an internal process in place for candidates to appeal the marking of internally marked components, ie the synoptic assignment and any optional unit assignments. This must take place before the submission of marks for moderation. The internal process must include candidates being informed of the marks (or grades) the centre has given for internally assessed components, as they will need these to make the decision about whether or not to appeal.

Centres cannot appeal the outcome of moderation for individual candidates, only the moderation process itself. A request for a review of the moderation process should be made to **appeals@cityandguilds.com**.

## Moderation

Moderation is the process where external markers are standardised to a national standard in order to review centre marking of internally marked assessments. These markers are referred to as 'moderators'. Moderators will mark a representative sample of candidates' work from every centre. Their marks act as a benchmark to inform City & Guilds whether centre marking is in line with City & Guilds' standard.

Where moderation shows that the centre is applying the marking criteria correctly, centre marks for the whole cohort will be accepted.

Where moderation shows that the centre is either consistently too lenient or consistently too harsh in comparison to the national standard, an appropriate adjustment will be made to the marks of the whole cohort, retaining the centre's rank ordering.

Where centre application of the marking criteria is inconsistent, an appropriate adjustment for the whole cohort may not be possible on the basis of the sample of candidate work. In these instances a complete remark of the candidate work may be necessary. This may be carried out by the centre based on feedback provided by the moderator, or carried out by the moderator directly.

Moderation applies to all internally marked assignments. Following standardisation and marking, the centre submits all marks and candidate work to City & Guilds via the moderation platform. The deadline for submission of evidence will be available on Walled Garden. See the *Marking and moderation - Technicals Centre Guidance* document for full details of the requirements and process.

In most cases candidate work will be submitted directly to the moderator for moderation. This includes written work, photographic and pictorial evidence, or video and audio evidence. For some qualifications there will be a requirement for moderators to visit centres to observe practical assessments being undertaken. This will be for qualifications where the assessment of essential learner skills can only be demonstrated through live observation. The purpose of these visits is to ensure that the centre is assessing the practical skills to the required standards, and to provide the moderators with additional evidence to be used during moderation. These visits will be planned in advance with the centre for all relevant qualifications.

## Post-moderation procedures

Once the moderation process has been completed, the confirmed marks for the cohort are provided to the centre along with feedback from the moderator on the standard of marking at the centre, highlighting areas of good practice, and potential areas for improvement. This will inform future marking and internal standardisation activities.

City & Guilds will then carry out awarding, the process by which grade boundaries are set with reference to the candidate evidence available on the platform.

### **Centres retaining evidence**

Centres must retain assessment records for each candidate for a minimum of three years. To help prevent plagiarism or unfair advantage in future versions, candidate work may not be returned to candidates. Samples may however be retained by the centre as examples for future standardisation of marking.

## 7 Grading

### Awarding individual assessments

Individual assessments will be graded, by City & Guilds, as pass/merit/distinction where relevant. The grade boundaries for pass and distinction for each assessment will be set through a process of professional judgement by technical experts. Merit will usually be set at the midpoint between pass and distinction. The grade descriptors for pass and distinction, and other relevant information (eg archived samples of candidate work and statistical evidence) will be used to determine the mark at which candidate performance in the assessment best aligns with the grade descriptor in the context of the qualification's purpose. Boundaries will be set for each version of each assessment to take into account relative difficulty.

Please note that as the Merit grade will usually be set at the arithmetical midpoint between pass and distinction, there are no descriptors for the Merit grade for the qualification overall.

### Grade descriptors

#### To achieve a pass, a candidate will be able to

- Demonstrate the knowledge and understanding required to work in the occupational area, its principles, practices and legislation.
- Describe some of the main factors impacting on the occupation to show good understanding of how work tasks are shaped by the broader social, environmental and business environment it operates within.
- Use the technical industry specific terminology used in the industry accurately.
- Demonstrate the application of relevant theory and understanding to solve non-routine problems.
- Interpret a brief for complex work related tasks, identifying the key aspects, and showing a secure understanding of the application of concepts to specific work related tasks.
- Carry out planning which shows an ability to identify and analyse the relevant information in the brief and use knowledge and understanding from across the qualification (including complex technical information) to interpret what a fit for purpose outcome would be and develop a plausible plan to achieve it.
- Achieve an outcome which successfully meets the key requirements of the brief.
- Identify and reflect on the most obvious measures of success for the task and evaluate how successful they have been in meeting the intentions of the plan.
- Work safely throughout, independently carrying out tasks and procedures, and having some confidence in attempting the more complex tasks.

#### To achieve a distinction, a candidate will be able to

- Demonstrate the excellent knowledge and understanding required to work to a high level in the occupational area, its principles, practices and legislation.
- Analyse the impact of different factors on the occupation to show deep understanding of how work tasks are shaped by the broader social, environmental, and business environment it operates within.
- Demonstrate the application of relevant theory and understanding to provide efficient and effective solutions to complex and non-routine problems.
- Analyse the brief in detail, showing confident understanding of concepts and themes from across the qualification content, bringing these together to develop a clear and stretching plan that would credibly achieve an outcome that is highly fit for purpose.
- Achieve an outcome which shows an attention to detail in its planning, development and completion, so that it completely meets or exceeds the expectations of the brief to a high standard.

- Carry out an evaluation in a systematic way, focussing on relevant quality points, identifying areas of development/ improvement as well as assessing the fitness for purpose of the outcome.

## Awarding grades and reporting results

The overall qualification grade will be calculated based on aggregation of the candidate's achievement in each of the assessments for the mandatory units, taking into account the assessments' weighting. The **Level 3 Advanced Technical Certificate in Digital Technologies** will be reported on a four grade scale: Pass, Merit, Distinction, Distinction\*.

All assessments **must** be achieved at a minimum of Pass for the qualification to be awarded. Candidates who fail to reach the minimum standard for grade Pass for an assessment(s) will not have a qualification grade awarded and will not receive a qualification certificate.

The contribution of assessments towards the overall qualification grade is as follows:

Assessment method	Grade scale	% contribution
Synoptic Assignment	X/P/M/D	60%
Exam	X/P/M/D	40%

Both synoptic assignments and exams are awarded (see 'Awarding individual assessments', at the start of Section 7, above), and candidates' grades converted to points. The minimum points available for each assessment grade is listed in the table below. A range of points between the Pass, Merit and Distinction boundaries will be accessible to candidates. For example a candidate that achieves a middle to high Pass in an assessment will receive between 8 and 10 points, a candidate that achieves a low to middle Merit in an assessment will receive between 12 and 14 points. The points above the minimum for the grade for each assessment are calculated based on the candidate's score in that assessment.

	Pass	Merit	Distinction
Synoptic Assignment: 60%	6	12	18
Exam: 40%	6	12	18

The candidate's points for each assessment are multiplied by the % contribution of the assessment and then aggregated. The minimum points required for each qualification grade are as follows:

Qualification Grade	Minimum points
Distinction*	20.5
Distinction	17
Merit	11
Pass	6

Candidates achieving Distinction\* will be the highest achieving of the Distinction candidates.

## 8 Administration

Approved centres must have effective quality assurance systems to ensure valid and reliable delivery and assessment of qualifications. Quality assurance includes initial centre registration by City & Guilds and the centre's own internal procedures for monitoring quality assurance procedures.

Consistent quality assurance requires City & Guilds and its associated centres to work together closely; our Quality Assurance Model encompasses both internal quality assurance (activities and processes undertaken within centres) and external quality assurance (activities and processes undertaken by City & Guilds).

For this qualification, standards and rigorous quality assurance are maintained by the use of:

- internal quality assurance
- City & Guilds external moderation.

In order to carry out the quality assurance role, Internal Quality Assurers (IQAs) must have and maintain an appropriate level of technical competence and have recent relevant assessment experience. For more information on the requirements, refer to *Section 2: Centre requirements* in this handbook.

To meet the quality assurance criteria for this qualification, the centre must ensure that the following procedures are followed:

- suitable training of staff involved in the assessment of the qualification to ensure they understand the process of marking and standardisation
- completion by the person responsible for internal standardisation of the Centre Declaration Sheet to confirm that internal standardisation has taken place
- the completion by candidates and supervisors/tutors of the record form for each candidate's work.

### External quality assurance

City & Guilds will undertake external moderation activities to ensure that the quality assurance criteria for this qualification are being met. Centres must ensure that they co-operate with City & Guilds staff and representatives when undertaking these activities.

City & Guilds requires the Head of Centre to

- facilitate any inspection of the centre which is undertaken on behalf of City & Guilds
- make secure arrangements to receive, check and keep assessment material secure at all times, maintain the security of City & Guilds confidential material from receipt to the time when it is no longer confidential and keep completed assignment work and examination scripts secure from the time they are collected from the candidates to their dispatch to City & Guilds.

### Enquiries about results

The services available for enquiries about results include a review of marking for exam results and review of moderation for internally marked assessments.

For further details on enquiries and appeals process and for copies of the application forms, please visit the **appeals page** of the City & Guilds website at **[www.cityandguilds.com](http://www.cityandguilds.com)**.



## Re-sits and shelf-life of assessment results

Re-sits and shelf-life of assessment results Candidates who have failed an exam or wish to re-take it in an attempt to improve their grade, can do so **twice**. The best result will count towards the final qualification. See guidance on individual assessment types in Section 5.

## Factors affecting individual learners

If work is lost, City & Guilds should be notified immediately of the date of the loss, how it occurred, and who was responsible for the loss. Centres should use the JCQ form, JCQ/LCW, to inform City & Guilds Customer Services of the circumstances.

s who move from one centre to another during the course may require individual attention. Possible courses of action depend on the stage at which the move takes place. Centres should contact City & Guilds at the earliest possible stage for advice about appropriate arrangements in individual cases.

## Malpractice

Please refer to the City & Guilds guidance notes *Managing cases of suspected malpractice in examinations and assessments*. This document sets out the procedures to be followed in identifying and reporting malpractice by candidates and/or centre staff and the actions which City & Guilds may subsequently take. The document includes examples of candidate and centre malpractice and explains the responsibilities of centre staff to report actual or suspected malpractice. Centres can access this document on the City & Guilds website.

Examples of candidate malpractice are detailed below (please note that this is not an exhaustive list):

- falsification of assessment evidence or results documentation
- plagiarism of any nature
- collusion with others
- copying from another candidate (including the use of ICT to aid copying), or allowing work to be copied
- deliberate destruction of another's work
- false declaration of authenticity in relation to assessments
- impersonation.

These actions constitute malpractice, for which a penalty (eg disqualification from the assessment) will be applied.

Where suspected malpractice is identified by a centre after the candidate has signed the declaration of authentication, the Head of Centre must submit full details of the case to City & Guilds at the earliest opportunity. Please refer to the form in the document *Managing cases of suspected malpractice in examinations and assessments*.

## Access arrangements and special consideration

Access arrangements are adjustments that allow candidates with disabilities, special educational needs and temporary injuries to access the assessment and demonstrate their skills and knowledge without changing the demands of the assessment. These arrangements must be made before assessment takes place.

It is the responsibility of the centre to ensure at the start of a programme of learning that candidates will be able to access the requirements of the qualification.

Please refer to the *JCQ access arrangements and reasonable adjustments and Access arrangements - when and how applications need to be made to City & Guilds* for more information.

Both are available on the City & Guilds website: <http://www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library/policies-and-procedures/access-arrangements-reasonable-adjustments>

### **Special consideration**

We can give special consideration to candidates who have had a temporary illness, injury or indisposition at the time of the examination. Where we do this, it is given after the examination.

Applications for either access arrangements or special consideration should be submitted to City & Guilds by the Examinations Officer at the centre. For more information please consult the current version of the JCQ document, *A guide to the special consideration process*. This document is available on the City & Guilds website: <http://www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library/policies-and-procedures/access-arrangements-reasonable-adjustments>

<b>UAN:</b>	Y/506/5049
<b>Level:</b>	3
<b>GLH:</b>	30

### **What is this unit about?**

This unit is about Project Management techniques that can be used to ensure that a project delivers to scope, budget and time. Learners will explore project management techniques such as GANTT charts, milestones and critical paths. Project Management requires flexibility and it is often the case that a contingency plan is needed.

The project plan itself should be considered as a checklist to be used to monitor a project, it should not be considered as a strict formula, as the project manager needs to be able to change the approach in response to ever changing environments. Any changes to an original plan need to be fully documented in order to create an audit trail and to aid future developments.

The purpose of this unit is for learners to look at key aspects of project management. Learners will gain an understanding of the roles and responsibilities of those involved, especially the Project Manager, and explore some of the documentation that can be used to identify the key criteria that must be satisfied in order to deliver a successful project.

Learners may be introduced to this unit by asking themselves questions such as:

- Why should I use project management?
- What terminology do I need to understand in relation to project management?
- Do project life cycles affect my planning and management?
- What skills do I need to manage a project effectively?
- How do I determine the success of a project?

### **Learning outcomes**

In this unit, learners will be able to:

1. apply the principles of project management
2. apply the stages of project management life cycles
3. present a project review

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

**Please note** that the supporting bullet points throughout this unit are not definitive.

### Learning outcome:

#### 1. Apply the principles of project management

### Topics

1.1 The application of the principles of project management including:

- define the **governance**
- define the **purpose** of a project
- outline **viability and financial considerations**
- set and monitor **indicators of progress**
- identify **risks and contingencies**
- agree final project specification

1.2 Define the **roles and responsibilities** within a project

#### Topic 1.1

Learners must be able to apply the principles of project management relative to the size, complexity and cost of a project including but not limited to:

- Governance:
  - sponsor
  - project commissioning
  - steering committee
  - cadence reviews
- Purpose:
  - justification for a project
  - aim and subordinate objectives (eg Specific, Measurable, Agreed, Realist Time-bound Evaluated, Reviewed (SMARTER))
  - outline a project specification
- Viability and financial considerations:
  - estimating
  - cost control
  - payback period
  - discounted cash flow / net present value
  - Return on Investment (ROI)
  - quality of service
  - business transformation
  - compliance requirements eg change in legislation
  -
- Indicators of progress:
  - utilise technology to create information such as GANTT charts and project reports
  - critical tasks list
  - milestones
  - stage sign offs
- Risks issues and contingency planning:
  - scope creep
  - planned time slippage
  - financial
  - human resources
  - critical tasks
  - dependencies

- environmental considerations eg weather
- Agree final project specification

In addition to the above learners need to apply the following principles relative to the size, complexity and cost of a project, including but not limited to:

- Project organisation structures:
  - hierarchical
  - flat
  - functional
  - matrix
  - product
  - geographical
- Project documentation:
  - terms of reference
  - review and approval of deliverables
  - business case
  - budget plans
  - required resources
  - project outline
  - project initiation, justification or feasibility
  - project plan
    - identifying the critical path on a basic project network using a given formula
    - calculating the earliest and latest start and finish dates
    - calculating the total float on activities in an Activity on Node (AoN) Network
  - Chart(s) showing project activities (eg Gantt, AoN)
- Criteria for a successful project:
  - objectives eg SMARTER
- Constraints and dependencies:
  - predecessors
  - successors
  - critical tasks
  - time
- tolerances
- previous experience
- human resources

## Topic 1.2

Learners should be able to define the roles and responsibilities within a project including but not limited to:

### Roles and responsibilities:

- sponsor (executive)
- users
- customers / clients
- suppliers / partners
- project team
  - project manager
  - specialists
    - financial staff
    - resource manager
    - estimators
    - design staff
    - team manager (leader)
    - project support office

## **Learning outcome:**

### **2. Apply the stages of project management life cycles**

#### **Topics**

2.1 Document the key stages within project life cycles:

- viability
- plan
- develop and implement
- review

2.2 Use life cycle models

#### **Topics 2.1, 2.2**

In order for learners to be able to meet project management needs they will need to be able to apply their understanding of various life cycle models that will include a number of stages. Learners will also need to be aware that project life cycles exist in a number of different models eg Spiral, Waterfall, Agile etc.

Learners will need to be aware that there are as many different staging models for projects as there are approaches to project management. There is preferred or recommended staging model other than that which works for a given situation – unless the organisation concerned stipulates specific stages.

Therefore learners will need to appreciate that the actual model to use will depend on the specific nature of the projects.

## **Learning outcome:**

### **3. Present a project review**

#### **Topics**

3.1 Review the outcome of a specified project

3.2 Use technology to communicate the review of a project

#### **Topics 3.1, 3.2**

Learners will need to be able to review a project taking into account the application of the principles and stages identified in learning outcomes 1 and 2. The review should include but is not limited to evidence of :

- a summary of the purpose of the project and if the objectives were met (and if not, why)
- that the main roles and responsibilities within a project were identified
- how the estimations were derived
- how the project plan was implemented
- lessons learnt
- recommendations for future projects/ developments

Learners should be able to use technology to communicate the review as specified above. This should include a direct presentation to peer groups. The communication and presentation may include but is not limited to:

Communication:

- emails
- collaborative technologies (eg virtual meetings/dashboards)
- intranet

- posting eg collaborative website
- notices eg flipcharts, poster

Presentation:

- verbal
  - video conferencing
  - presentation SOF

## Guidance for delivery

This unit can be used alongside virtually all of the other units. It could be used as the foundation for a learner's project and would help guide learners through the process of completing their other work.

A project could be set and linked to this unit to allow learners to outline, plan, manage, review and communicate in areas that are of interest to them. This could be a project to implement a new communication system to be used in a large business environment and should take into account budget, system specification of hardware, software, network requirements, installation and commissioning. The project should be relevant to the learner and reflect the units that they are undertaking to ensure relevancy.

In order for learners to understand project life cycles they are encourage to:

- research three different examples of a project or system life cycle
- select the correct system development life cycle for a given situation
- draw and describe an example of a system life cycle eg waterfall

## Suggested learning resources

### **Project Management                      Healy P**

Published by: Butterworth-Heinemann, 1997  
ISBN: 0-7506-8943-9

### **The Handbook of PROJECT-BASED MANAGEMENT                      Turner J R**

Published by: McGraw-Hill, 1999  
ISBN: 0-07-709161-2

### **The PROJECT MANAGER                      Newton R**

Published by: Pearson Education, 2005  
ISBN: 978-0-273-70173-6

### **Practical Project Management - Tips, Tactics and Tools                      Levine, H A**

Published By: Wiley, 2002  
ISBN: 0-47-120303-3

### **PROJECT MANAGEMENT BODY OF KNOWLEDGE (PMBOK® GUIDE)**

Published by: Project Management Institute, 2013  
ISBN: 978-1-935589-67-9

### **Website**

Association of Project Management      <http://www.apm.org.uk/WhatIsPM>

<b>UAN:</b>	L/506/5050
<b>Level:</b>	3
<b>GLH:</b>	60

### **What is this unit about?**

The aim of this unit is to give an introduction to the principles concerned with the security of Information Technology systems and data. Learners should explore a range of techniques used to enhance security of systems and data. The unit will also explore network infrastructure security, and how security measures can be both physical and logical.

Learners will also explore new and emerging technologies used for cryptography and will have the opportunity to research cryptographic techniques that are applied in organisations.

Learners may be introduced to this unit by asking themselves questions such as:

- Why should I be concerned with security?
- How can I secure a network?
- Do I know what security threats are faced by organisations?
- What is cryptography?

### **Learning outcomes**

In this unit, learners will be able to:

1. Apply security concepts
2. Determine infrastructure security
3. Identify types of cryptography



## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

**Please note** that the supporting bullet points throughout this unit are not definitive.

### Learning outcome:

#### 1. Apply security concepts

### Topics

#### 1.1 Types of **access control methods**

#### 1.2 **Vulnerabilities and threats**

#### 1.3 Protect technology systems

Learners will need to understand why it is important to implement security measures in order to protect IT systems and data considering the following:

- confidentiality
- integrity
- availability
- the inevitable trade off between security and utility

**Topic 1.1:** Learners should be able to understand the characteristics of access control methods and be able to differentiate between them to include but not limited to:

Access control methods:

- MAC (Mandatory Access Control)
- DAC (Discretionary Access Control)
- RBAC (Role Based Access Control)
- ABAC (Attribute Based Access Control)

**Topic 1.2:** Learners should be able to understand the appropriate actions necessary to mitigate (or control) vulnerabilities. Risks and threats can include but are not limited to:

Risks and threats:

- DOS / DDOS (Denial of Service / Distributed Denial of Service)
- back door
- spoofing
- man in the middle
- replay
- TCP/IP Hijacking
- weak keys
- mathematical
- social engineering
- birthday
- password guessing, brute force, dictionary, software exploitation
- malware

**Topic 1.3:** Learners need to apply controls (or countermeasures) to protect against different types of malicious code and be able to demonstrate an appropriate course of action to mitigate vulnerability and risk, to include but not limited to:

- Viruses
- Trojan Horses
- Logic bombs

- Worms
- Watering Holes

## Learning outcome:

### 2. Determine infrastructure security

#### Topics

- 2.1 The mitigation of risks associated with technology systems
- 2.2 Security vulnerabilities associated with **storage media**
- 2.3 Security vulnerabilities associated with **networking infrastructure**
- 2.4 Types of **intrusion detection methods**
- 2.5 **Security baselines**

#### Topic 2.1

Learners need to understand the vulnerabilities of servers, workstations and mobile devices and their operating systems to include but not limited to:

- workstations
- servers
- mobile devices
- wireless
- RAS (Remote Access Server)
- VPN (Virtual Private Network)
- IDS (Intrusion Detection System)
- network monitoring / diagnostic

#### Topic 2.2

Learners need to understand the security vulnerabilities associated with different types of storage media to include but not limited to:

Storage media:

- removable media
- external storage eg Cloud
- data servers
- local media eg hard disk

#### Topic 2.3

Learners should understand the security risks, vulnerabilities associated with different networking infrastructures (physical and logical) to include but not limited to:

Networking infrastructures:

- coaxial cable
- unshielded twisted pair / shielded twisted pair (UTP / STP)
- fibre optic cable
- firewalls
- hubs, switches and routers
- security zones
- VLANs (Virtual Local Area Network)
- NAT (Network Address Translation)
- VPN
- tunnelling

### Topic 2.4

Learners should be able to differentiate between different types of intrusion detection methods to include but not limited to:

Intrusion detection methods:

- network based
- host based
- honey pots
- incident response

Learners need to understand the concepts behind each type, along with the implementation and configuration of each type of intrusion detection system.

### Topic 2.5

Learners should understand the concepts behind the types of security baselines to include but not limited to:

Security baselines:

- OS / NOS (Operating System / Network Operating System) hardening
- network hardening
- application hardening

Learners need to understand what a security baseline is, and understand the implementation and configuration of each type of baseline.

In addition to security baselines, Learners will need to understand the trust implications that can apply when accessing online services. This can include identity management through single-sign on authentication and authorisation to access specific resources. Learners will be able to recognise the difference between service provider identity management and the development of providing an online identify from own enterprise identity store (IdP).

## Learning outcome:

### 3. Identify types of cryptography

#### Topics

- 3.1 Types of **cryptographic algorithms**
- 3.2 Cryptography addresses
- 3.3 Public key/Private key infrastructure
- 3.4 The concepts of key management and certificate lifecycles

### Topic 3.1

Learners should understand different types of cryptographic algorithms to include but not limited to:

Cryptographic algorithms:

- Hashing
- Symmetric
- Asymmetric
- RSA
- Public key
- Private key

### Topic 3.2

Learners should understand how cryptography is employed to address different Information Security needs including but not limited to:

- confidentiality
- integrity
- authentication/non-repudiation
- access control

### Topics 3.3, 3.4

Learners need to understand Public key/Private key infrastructure and the concepts of key management and certificate lifecycles to include but not limited to:

- certificates and granting authorities
- revocation
- trust models
- centralised V's decentralised
- storage
- escrow
- expiration
- suspension
- recovery
- renewal
- destruction
- key usage eg public, private

## Guidance for delivery

In order to complete this unit the learner should have access to scenarios where systems have been infected or attacked maliciously.

Learners should have an opportunity where possible to counter attacks and intrusions using a range of technologies and software.

Learners must also be encouraged to research high profile attacks that have been covered in the press, especially their causes and impact.

## Suggested learning resources

IT Security: <http://www.itsecurity.com/>

Computer Weekly: <http://www.computerweekly.com/resources/IT-security>

Search Security: <http://searchsecurity.techtarget.com/>

Bletchley Park Trust (Education Resources): <http://www.bletchleypark.org.uk/edu/resources.rhtm>

The National Museum of Computing (Education Resources):  
<http://www.tnmoc.org/learn/educational-visits>

### Professional Bodies, Trade Associations and Sector Skills Council

Information Security Specialist Group (ISSG) of BCS The Chartered Institute for IT: <http://www.bcs-issg.org.uk>

The Institute of Information Security Professionals: <https://www.iisp.org/imis15/>

The Worshipful Company of Information Technologists: <http://www.wcit.org.uk>

e-skills UK: <https://www.e-skills.com/professional-development/cyber-security/>

The Cyber Security Challenge UK: <https://cybersecuritychallenge.org.uk/existingsponsors.php>

<b>UAN:</b>	R/506/5051
<b>Level:</b>	3
<b>GLH:</b>	60

### **What is this unit about?**

Since the advent of the Internet, networking is probably the single most pervasive technology that influences our professional and private lives from using our mobile phones to Internet banking.

The purpose of this unit is to provide learners with an understanding and practical experience of the principles involved in computer networking through interconnecting static network devices such as desktop computers, mobile network devices, and home appliances, using multiple methods.

Learners may be introduced to this unit by asking themselves questions such as:

- How do I create a network?
- What hardware and software do I need to create a network?
- How do I connect my phone to a network?
- What is the 'Internet of Things'?

### **Learning outcomes**

In this unit, learners will be able to:

1. determine physical and logical network topologies and components
2. recognise the Open System Interconnection (OSI) model of networking
3. recognise the Transmission Control Protocol/Internet Protocol (TCP/IP) model of networking
4. configure networks

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

**Please note** that the supporting bullet points throughout this unit are not definitive.

## Learning outcome:

### 1. Determine physical and logical network topologies and components

## Topics

- 1.1 The difference between **physical** and **logical** network topologies **Vulnerabilities and threats**
- 1.2 Hardware and software **technologies** used in networking

### Topic 1.1

Learners should be able to differentiate between the physical and logical network topologies; while understanding the standards that apply to different networks.

#### Physical:

- Point to Point eg Plain Old Telephone Service (POTS)
- Ring
- Bus
- Star
- Mesh (fully connected)
- Mesh (Partially connected)
- Cellular
- LANs
- WANs

#### Logical:

- Clock based
- Token passing
- Broadcast (eg Ethernet and Wireless)

#### Standards:

- IEEE 802.xx
- Wireless
- Bluetooth
- 3G / 4G (LTE) / 5G ('beyond 2020')

### Topic 1.2

Learners should understand the different hardware and software components that may be used to implement a network, including but not limited to:

#### Technologies:

- network hardware
  - workstation
  - server
  - Network Interface Card (NIC)
  - repeater
  - hub (active / passive / intelligent)
  - bridge
  - switch
  - router

- gateway
- network software and applications
  - network operating system
  - firewall
  - proxy server
  - web server
  - anti-virus / anti-malware
  - text based messaging systems
  - video conferencing
  - VOIP
- interconnection technologies
  - cable types and connectors
    - Cat 5 and RJ11 / RJ45 connectors
    - Cat 5e
    - Cat 6
    - Coaxial and F / BNC / RCA / RG6 / RG59 connectors
    - Fibre Optic and ST / SC / FC / LC connectors
  - radio technologies
    - Wireless
    - Bluetooth
    - 3G / 4G (LTE) / 5G ('beyond 2020')

## Learning outcome:

### 2. Recognise the Open Systems Interconnection (OSI) model of networking

#### Topics

2.1 The **7 Layers** of the OSI model and the **relationship** between each layer

2.2 The network **functionality** within each layer

#### Topic 2.1

Learners should be able to identify the 7 Layers of the OSI model and the relationship between each of the layers.

7 layers of the OSI model:

- Application
- Presentation
- Session
- Transport
- Network
- Data Link
- Physical

Relationship (including but not limited to):

- hardware
- software
- encapsulation
- protocols



## Topic 2.2

Learners should be able to determine which network function(s) takes place at each layer, including but not limited to:

Functionality:

- network processes to applications
- data representation
- interhost communication
- end-to-end connectivity
- address and 'best path'
- access to media
- binary transmission

## Learning outcome:

### 3. Recognise the Transmission Control Protocol/Internet Protocol (TCP/IP) model of networking

## Topics

- 3.1 The **layers** of the TCP/IP model and the **relationship** between each layer Cryptography addresses
- 3.2 The network **functionality** within each layer of the TCP/IP model
- 3.3 The **relationship(s)** between the OSI 7 Layer model and the TCP/IP model

## Topic 3.1

Learners should be able to identify the layers of the TCP/IP model and understand the relationship between each layer.

Layers of the TCP/IP model:

- Application
- Transport
- Network/Internet
- Network Interface

Relationship ( including but not limited to):

- hardware
- software
- encapsulation
- protocols

## Topic 3.2

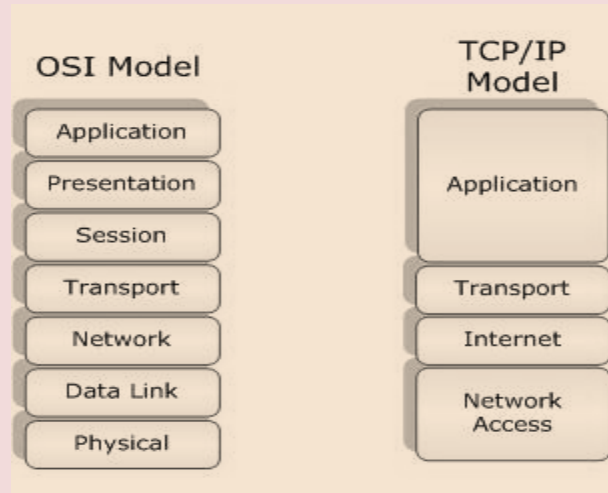
Learners should be able to identify which network function(s) takes place at each layer of the TCP/IP Model, including but not limited to:

Functionality:

- application programs using the network
- management of end-to-end message transmission, error detection and error correction
- handling of datagrams: routing and congestion
- management of cost effective and reliable data delivery, access to physical networks
- physical media

### Topic 3.3

Learners should be able to identify the relationship(s) between the TCP/IP model and the OSI models, including but not limited to:



Relationship:

- hardware
- software
- encapsulation
- protocols

### Learning outcome:

#### 4. Configure networks

### Topics

4.1 Connect multiple **network components**

4.2 Carry out the configuration of network **connection and security**

### Topic 4.1

Learners should be able to connect multiple network components (a minimum of 3) to construct a functioning network, which may include but should not be not limited to:

Network components:

- server(s)
- workstation(s)
- laptop(s)
- tablet device(s)
- mobile phone(s)
- printer
- hub
- switch
- router
- gateway
- ethernet
- USB
- wireless

- fibre optic
- network access point

## Topic 4.2

Learners should be able to configure networks in order to provide connectivity and security for devices and users, which may include but should not be limited to:

### Connectivity:

- ethernet
- USB
- wireless
- fibre optic
- IP v4
- IP v6

### Security and file sharing:

- usernames
- passwords
- network access
- network share

## Guidance for delivery

Wherever possible this unit should be delivered within a workshop environment providing learners with practical exercises or case studies. Learners should be encouraged to explore and use a wide range of hardware and software, this should also include researching and utilising new and emerging technologies.

Whichever method (s) are used, learners should experience a variety of technologies.

When creating the network learners should incorporate a **minimum of 4 nodes** plus at least one interconnection device. Learners may also add peripherals to the network if required.

## Suggested learning resources

IT Security: <http://www.itsecurity.com/>

Computer Weekly: <http://www.computerweekly.com/resources/IT-security>

Search Security: <http://searchsecurity.techtarget.com/>

Bletchley Park Trust (Education Resources): <http://www.bletchleypark.org.uk/edu/resources.rhtm>

The National Museum of Computing (Education Resources):  
<http://www.tnmoc.org/learn/educational-visits>

### Professional Bodies, Trade Associations and Sector Skills Council

Information Security Specialist Group (ISSG) of BCS The Chartered Institute for IT: <http://www.bcs-issg.org.uk>

The Institute of Information Security Professionals: <https://www.iisp.org/imis15/>

The Worshipful Company of Information Technologists: <http://www.wcit.org.uk>

e-skills UK: <https://www.e-skills.com/professional-development/cyber-security/>

The Cyber Security Challenge UK: <https://cybersecuritychallenge.org.uk/existingsponsors.php>

<b>UAN:</b>	Y/506/5052
<b>Level:</b>	3
<b>GLH:</b>	60

### **What is this unit about?**

The purpose of this unit is for learners to get an understanding of the various ways individuals and businesses can communicate online, the advantages and disadvantages of each and how to communicate safely.

The unit covers how individuals communicate using a range of digital tools whilst ensuring their own personal safety and promoting their own personal brand. As part of this unit learners will explore the use of a variety of social networks to communicate with others.

Learners will also analyse how businesses are using a range of digital communication tools to communicate with their audience.

The unit will include discussion and use of the following digital communication technology:

- emails
- collaboration tools
- social networks
- blogs
- a range of creative digital tools (including imaging, video and infographics)

Learners may be introduced to this unit by asking themselves questions such as:

- How can I use digital communication to promote myself?
- How does business use digital communication?
- What range of digital communication tools are used by businesses?
- How do I use digital communication tools?

### **Learning outcomes**

In this unit, learners will be able to:

1. use email to communicate with others
2. use collaboration tools to complete tasks
3. use social networks and blogs to communicate
4. evaluate how business brands communicate using social networks and blogs
5. create digital content
6. recognise ethical, legal and online implications when using digital communications

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

**Please note** that the supporting bullet points throughout this unit are not definitive.

### Learning outcome:

#### 1. Use email to communicate with others

### Topics

- 1.1 Set-up email application on devices
- 1.2 Compose and send e-mail messages following local guidelines
- 1.3 Manage incoming emails

Learners must be able to use email to communicate with others.

#### Topic 1.1

Learners need to be able to:

- set up email on a variety of devices
- understand the difference between POP / SMTP / IMAP
- understand the differences when using email
  - on the internet
  - through an email client
  - on a mobile device
- create and maintain an address book across devices
- compose and use an email signature across devices

#### Topic 1.2

Learners need to be able to:

- compose, format, send and forward e-mail messages to multiple recipients safely
- attach files to email messages
- understand the difference between cc and bcc and when they should be used
- understand potential restrictions when sending email messages, eg too many recipients, large attachments
- understand and use email encryption
- 

#### Topic 1.3

Learners need to understand when and how to respond to email messages and they should be able to :

- respond to email messages
- use folders to organise email messages.

### Learning outcome:

#### 2. Use collaboration tools to complete tasks

### Topics

- 2.1 Stay safe and secure when using collaborative technologies
- 2.2 Prepare collaborative technology for use
- 2.3 Manage tasks using collaborative technology

### **Topic 2.1**

Learners should be able to develop:

- guidelines for good practice when working with collaborative technology
- an identity and information that promotes trust.

Learners should know how to mitigate risks when using collaborative technologies eg disclosure of sensitive information.

### **Topic 2.2**

Learners should explore a range of collaborative tools including but not limited to wikis, social bookmarking, and google documents.

Learners should understand the features, benefits and limitations for different collaborative IT tools. How work is archived, the potential access and compatibility issues should also be explored.

Learners should be able to select, connect and configure a collaborative tool for use.

### **Topic 2.3**

Learners should use a collaborative tool for a purpose. They should be able to:

- manage access levels and permissions for different purposes
- facilitate others' responsible contributions to engage with the tool

Learners should understand why it is important to manage the moderation of others comments and how to moderate. They need to be aware of what problems can occur with collaborative technologies and understand how to respond to problems.

## **Learning outcome:**

### **3. Use social networks and blogs to communicate**

#### **Topics**

- 3.1 The importance of defining a personal brand before using digital communications
- 3.2 Define a personal brand
- 3.3 Evaluate how a personal brand is displayed on public and private digital communications
- 3.4 The social networks that can be used and the differences between them for personal and business use
- 3.5 Manage profiles on social networks to represent personal brand
- 3.6 Set security settings on social networks for personal and business use
- 3.7 Engage with others on social networks
- 3.8 The difference between a blog and a web page
- 3.9 Create a blog with posts

Learners must be aware of their own personal brand – what they stand for and how they want to represent themselves to others. They need to be aware that employers and others will search for them across the internet and what is found should represent their personal brand. They also need to understand that knowing their personal brand can help them to respond to digital communications appropriately.

### **Topic 3.1**

Learners should understand:

- the importance of individuals being represented consistently online and offline
- that personal brand awareness will enable them to moderate what communicate on public digital communications.

### **Topic 3.2**

Learners should consider each aspect of their own personal brand.

Aspect of personal brand:

- values
- skills
- goals
- visual impact
- interests
- personality

### **Topic 3.3**

Learners should be able to:

- analyse how digital communication reflects a personal brand
- identify differences between public and private digital communications
- suggest changes that may be made to an individual's digital communication

As part of the teaching learners are expected to generate evidence of the processes listed in topic 3.3.

### **Topic 3.4**

Learners should understand the differences between the main social networks for personal and business use.

### **Topic 3.5**

Learners should be able to:

- create and update their profile on a range of social networks
- use imagery and profile content to represent their individual personal brand

### **Topic 3.6**

Learners should understand how security settings differ across social network platforms and why different security settings might be used for personal and business use.

Learners should be able to set security settings for a range of social networks for a purpose.

### **Topic 3.7**

Learners should be able to engage with others on social networks by

- connecting with others across a range of social networks
- using a range of social networks to engage with others
- understanding how to use language, tone and voice to represent their personal brand.

### **Topic 3.8**

Learners should understand the differences between blogs and websites and know why to choose one over the other for personal and business use.

## **Learning outcome:**

### **4. Evaluate how business brands communicate using social networks and blogs**





## Topics

- 4.1 Why businesses use social networks and blogs to communicate
- 4.2 Analyse how businesses project brands on social networks
- 4.3 Analyse how business brands engage on social networks and blogs

Learners should be able to use a range of social networks.

### Topic 4.1

Learners should understand why businesses use social networking and blogging as a way of communicating with their audience.

### Topic 4.2

Learners should investigate how business brands use a range of social networks to project their brand in terms of consistent images, themes and messages.

## Learning outcome:

### 5. Create digital content

## Topics

- 5.1 Why businesses plan and use **digital content**
- 5.2 Types and characteristics of digital content
- 5.3 Tools to create and display digital content
- 5.4 Produce content to share on personal social networks

Learners should have an introduction to the type, range and characteristics of digital content including but not limited to:

Digital content:

- images
- videos
- infographics
- podcasts
- social bookmarking

### Topic 5.3

For each type of digital content, learners should understand the range of tools available to create and display content. Note: this is an introduction, not an in depth exploration of the tools.

## Learning outcome:

### 6. Recognise ethical, legal and online implications when using digital communications

## Topics

- 6.1 Law compliance when using digital communication
- 6.2 Recommended behaviour when using digital communication
- 6.3 The use of business policies relating to digital communication
- 6.4 Ethical issues with relation to digital communication

This learning outcome covers why individuals and businesses need to be aware of the ethical and legal impact of what they share online. Learners also need to consider what contextually acceptable / unacceptable online behaviour is.

### **Topic 6.1**

Learners should understand the impact of laws when individuals and businesses use digital communications. Laws to be considered including but not limited to:

- Data Protection Act 1998
- Cookie Law
- Libel
- Harassment
- Consumer Protection from Unfair Trading Regulations 2008
- Privacy and Electronic Communications (ED Directive) Regulations 2003
- Copyright Law 1988

### **Topic 6.2**

Learners should understand implications of positive and negative behaviours when using digital technology including but not limited to:

- proper 'netiquette' communication skills
- effective solutions for cyber-bullying
- choosing the time and place to use digital tools
- recognise differences and etiquette within diverse digital communities

### **Topic 6.3**

Learners should understand the policies that businesses have in place relating to digital communication. These will include but not limited to:

- social media policy
- acceptable computer use

### **Topic 6.4**

Learners need to consider the ethical factors when using digital communication. Including, but not limited to:

- age appropriate marketing
- inclusivity
- corporate social responsibility
- equal access to digital communication
- free speech vs privacy
- speed of communication vs accuracy and quality
- file sharing / pirating vs legal downloads of software, music and video.

## **Guidance for delivery**

Learners may need support from the tutor and their peers to define their personal brand therefore they might need to support each other during the activities. Some of the activities will require group work but each learner will need to be given the opportunity to be the leader of the group.

During this module, learners should create or maintain personal profiles on a number of social networks and select security settings of their choice on each network. Learners should understand the consequences of their choice of security settings. Therefore centres will need to ensure learners have appropriate access to a range of social network platforms.

Learners should be encouraged to bring their own views and experience to the unit. There is often no 'right' answer, however learners will need to be able to give clear and rationalised arguments to back up their activity.

Learners should use available resources to support study which may include the use of libraries, websites, accessing research data, learning centres, articles, television programmes and other professionals.

Opportunities for professional development include formal opportunities such as English, IT and informal opportunities such as reading journals/articles/books, watching documentaries /programmes, use of internet.

## **Suggested learning resources**

Google Docs:	<a href="https://docs.google.com">https://docs.google.com</a>
Zoho Wiki:	<a href="https://wiki.zoho.com/">https://wiki.zoho.com/</a>
Delicious:	<a href="http://delicious.com">http://delicious.com</a>
Diigo:	<a href="http://www.diigo.com">http://www.diigo.com</a>
Using Social Media for Personal Gain:	<a href="http://bookboon.com/en/using-social-media-for-personal-gain-ebook">http://bookboon.com/en/using-social-media-for-personal-gain-ebook</a>
Blog Basics:	<a href="http://blogbasics.com/what-is-a-blog/">http://blogbasics.com/what-is-a-blog/</a>
Digital Law:	<a href="http://www.digitallawuk.com">http://www.digitallawuk.com</a>

<b>UAN:</b>	D/506/5053
<b>Level:</b>	3
<b>GLH:</b>	60

### **What is this unit about?**

The purpose of this unit is for learners to understand how programs are developed, the different purposes of programming languages, and the components that exist within them.

Learners will be able to identify the most appropriate programming language to use for given projects, the impact that data type declarations have on memory and existing technologies that can be used for e-commerce purposes.

This unit is only intended to give learners the background knowledge necessary to progress to using a programming language for a specific purpose.

Learners may be introduced to this unit by asking themselves questions such as:

- Where do I start in order to create an application?
- Are all programming languages the same?
- What is the purpose of software testing?
- Do I need to keep any records?
- Will this unit help me to create a website?

### **Learning outcomes**

In this unit, learners will be able to:

1. determine the design of programming languages
2. recognise common programming language data structures
3. determine application software for business purposes
4. create documented code.

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

**Please note** that the supporting bullet points throughout this unit are not definitive.

### Learning outcome:

#### 1. Determine the design of programming languages

### Topics

- 1.1 The differences between programming languages
- 1.2 The **systems life cycles**
- 1.3 The **testing** of software
- 1.4 The **storage** of information

#### Topic 1.1

In order to utilise the most appropriate programming language, learners need to understand how programming languages have developed and the different techniques they use, including but not limited to:

- understand how programming systems have developed
  - Low level languages
  - High level languages
  - Assembly code
- language techniques
  - Sequential programming – top down
  - Structured programming – eg procedural languages)
  - Object oriented
  - Event driven

#### Topic 1.2

In order to understand how software applications are developed and maintained, learners should explore different life systems life cycles models. Within systems life cycles, learners should understand the importance of effective planning prior to coding and testing prior to implementation. The life cycle models can include but are not limited to:

##### Systems life cycle models:

- Standard Life Cycle
  - simplistic design
  - each of the four stages can have their own independent life cycle
- Waterfall
  - completion of each phase prior to moving onto the next phase of the cycle
- Prototyping
  - uses an early approximation of a final system
- Spiral
  - combines the features of the prototyping model and the waterfall model
- Agile
  - supports the assessment of project direction throughout the development lifecycle

Learners should be able to understand that whichever systems life cycle model is employed, in order to support development and future maintenance, documentation needs to be created which includes but is not limited to:

#### Documentation:

- Requirements document
  - overview of project aims
  - design specification
  - project management
- System functionality and data flows
  - Data Flow Diagrams
  - JSP Charts
  - Pseudo code
  - Rapid application development (RAD)
- Test Plans
  - known inputs
  - expected outputs
- Test logs
  - actual outputs to know inputs
  - run-time errors
- Review
  - including any amendments to the original design

### **Topic 1.3**

Learners need to explore different testing techniques prior to any roll-out. The technique selected for a given project should ensure that any testing is both rigorous and fully documented. This can include but is not limited to:

#### Testing Techniques:

- Black box
- White box
- Volume
- Functionality
  - Usage
  - Target environment
  - Component
- Boundary

#### Types of errors:

- Syntax
- Logical
- Runtime

#### Documentation:

- Test Plan
- Test Log

### **Topic 1.4**

Learners need to explore how data is actually stored. Learners must be aware that compilers convert the textual code into binary digits and that the Central Processing Unit (CPU) works through instruction sets. Storage includes but is not limited to:

#### Storage:

- Memory
  - RAM
    - for immediate use
    - volatility

- Permanent storage
  - hard disk
  - optical
  - ROM
- Number formats
  - decimal (Base 10)
  - binary
  - hexadecimal
  - compiler conversion
- CPU
  - Instruction Set Architecture (ISA)

## Learning outcome:

### 2. Recognise common programming language data structures

## Topics

- 2.1 Data structures
- 2.2 Programming constructs
- 2.3 Object oriented programming

### Topic 2.1

Learners need to understand that all programming languages share some common design features. In coding programs, learners will need to be aware of naming conventions and the use of reserved words, especially those which have specific purposes or are used as CPU instructions. They include but are not limited to:

#### Features:

- Data types (eg char, float etc.)
- Arrays
- Stacks
- Queues
- Naming conventions
  - Use of key words
  - Consistency
- Declaring variables
  - Impact of variables on memory allocation
  - Local
  - Global
  - Static
- Functions
  - Pre-defined
  - Coded
- Compiler directives (eg #include)
- Comments explaining code operation.

### Topic 2.2

Learners need to explore how algorithms are used to solve simple or complex problems. They should understand that algorithms can use decisions, iterations or selections to control pathways. They include but are not limited to:

#### Algorithms:

- solutions to a problem



- mathematic calculations
- can comprise of either simple or complex code

#### Decisions:

- Conditional checks
- Conditional statements if, if...else
- Switch()

#### Iterations:

- For()
- While()
- Do...while()
- If()

### **Topic 2.3**

Learners will be able to explore the basic constructs of object oriented programs in relation to how data objects can be manipulated to reflect real world objects.

#### Constructs:

- fundamentals of classes
- encapsulation
- inheritance
- polymorphism.

## **Learning outcome:**

### **3. Determine application software for business purposes**

## **Topics**

#### 3.1 Integrated software **applications**

#### 3.2 Web applications

### **Topic 3.1**

Learners need to understand that software applications are categorised by their intended use. Where applications are integrated learners must understand the need for integration. Learners should understand the difference between interfacing and integration. The types of applications include but are not limited to:

#### Applications:

- stand-alone
- integrated software suites
- networked
- Internet
- mobile devices

### **Topic 3.2**

Learners should explore the constructs of web applications and how websites are hosted. In order to successfully build and deploy an e-commerce website, learners must have knowledge of server and client side services, including how databases are linked to web pages.

### Website construction:

- Constructs
  - Html tags/elements
  - State v stateless
  - HTML5 (hyper text mark-up language) includes:
    - CSS (how the elements will look) cascaded style sheets
    - Scripting languages
  - Interpretation by web browsers
    - Status in session
  - Style sheets
- Hosting websites
  - Server-side
  - Client – side
- Web services
- Databases
  - Linking to websites
  - Security

## **Learning outcome:**

### **4. Create documented code**

## **Topics**

4.1 Develop software

4.2 Review development

### **Topics 4.1, 4.2**

Learners should be able to use the knowledge gained in learning outcomes 1- 3 in order to develop code through design, code, test and review one or more algorithms for specific purposes, using any programming language. The demonstration of knowledge can include but is not limited to:

#### Design:

- software requirements document
- design specification
- project timelines

#### Code:

- simple inputs and outputs
- sorting
- searching
- calculations
- selection
- iteration
- object orientation
- event actions

#### Test:

- test plan justifying the type of technique used
- test log showing actual outputs from know inputs

#### Review:

- feedback on project
- recommendations for improvements

## Guidance for delivery

The content of this unit is intended to give the learner an overview of program design, coding and testing.

The coding tasks could be directed towards creating a number of simple programs or one larger program, as long as they are capable of generating both input and output. Ideally, programs should explore the constructs of either event driven programs or those that encapsulate the development of classes.

The content of this unit should cover the fundamental knowledge needed to further develop programming skills in the Application Development unit. The Application Development unit could be delivered in such a way that it supports the chosen language for the programming project. This should reduce some of the time learners will need to understand and develop within the programming language software.

## Suggested learning resources

### Books

C# in easy steps

Anderson T, 2004

In Easy Steps Limited

ISBN-10: 1-84078-150-5

JavaScript in easy steps – 5th Edition

McGrath M, 2013

In Easy Steps Limited

ISBN-13: 978-1840785708

C++ Programming in easy steps

McGrath M, 2013

In Easy Steps Limited

ISBN-13: 978-184 0784329

Learning Python, 5th Edition

Lutz M, 2014

O'Reilly Media Inc.

ISBN-13: 978-1-449-35573-9

C/C++ Programmer's Reference

Schildt H, 1997

Osborne, McGraw-Hill

ISBN-10: 0-07-882367-6

The Java Tutorials: <http://docs.oracle.com/javase/tutorial/java/>

The Java SE Tutorial Downloads: <http://www.oracle.com/technetwork/java/javase/java-tutorial-downloads-2005894.html>

<b>UAN:</b>	K/506/5055
<b>Level:</b>	3
<b>GLH:</b>	60

### **What is this unit about?**

The purpose of this unit is for learners to acquire and demonstrate a range of skills involved in research. The collection and analysis of data can encompass both digital and non-digital research.

Learners will be given the opportunity of exploring a range of techniques used for the purpose of collecting data, analysing its contents for a given purpose and presenting the resulting information.

This unit is intended to explore the concepts of collecting and analysing data in order that it can support other units. In particular, this unit will support any unit that requires a feasibility study to be conducted or research to justify a given design.

Learners may be introduced to this unit by asking themselves questions such as:

- What is the difference between data and information?
- Where do I start to gather data?
- What sources of data can I use?
- Why do I need to justify sources of data?
- Is there a format for publishing the results of data analysis?
- How does integrity affect the results of data analysis?
- How can I ensure the integrity of all my data?

### **Learning outcomes**

In this unit, learners will be able to:

1. recognise the concepts of data analysis
2. determine the techniques used to collect data for analysis
3. determine how to present the results from data analysis
4. perform collection and analysis of data.

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

**Please note** that the supporting bullet points throughout this unit are not definitive.

## Learning outcome:

### 1. Recognise the concepts of data analysis

## Topics

- 1.1 Assess the need for research
- 1.2 Types of research and data sources
- 1.3 Explore methods of recording data

### Topic 1.1

Learners will need to understand that the correct implementation of data analysis supports both the statistical or logical interpretation of data that can be obtained from a variety of sources. In order for learners to be able to select the most appropriate collection and analysis technique, they must first be able to identify the intended purpose of any research.

Depending on the purpose, data research and analysis can either support or negate a need for change. In assessing the need for research, learners should recognise that the most common reasons for data analysis include but are not limited to:

- general research (eg education, planning)
- data collection (eg polls, emerging trends)
- modelling real life situations
- forecasting and prediction

Learners will also need to understand that the strategies employed for data collection and analysis should be open and represent the current context or intended goal of any research. Effective data analysis should not be biased from the outset by any pre-conceived conclusions.

### Topic 1.2

Having identified the purpose of the research, learners will need to understand the category that the research falls into and modify any approach accordingly in order to collect sufficient and appropriate data. The research categories for data collection and analysis include but are not limited to:

Qualitative research (eg non-numerical):

- interviews
- observations (unobtrusive)
- documentation
- field studies/notes
- biographies
- audio/video files

Quantitative research (eg numerical):

- statistics
- existing numerical data
- metrology
- exploration (eg land, space)
- surveys

- repeated experiments

Learners will need to understand that data can be discrete or continuous.

### Topic 1.3

Learners will need to explore different methods of gathering data from a range of sources and to support different types of research. They will need to be aware that all conclusions reached need to be justified and evidenced through the analysis. Primary, secondary sources and tertiary of data used for analytical purposes can be recorded in various formats.

Primary sources (can include but are not limited to):

- direct evidence
- first hand knowledge
- personal correspondence
- census records
- official logs
- personal accounts
- recordings (eg documentaries, audio or video)
- photographs
- documentation (eg newspapers, books)

Secondary sources (can include but are not limited to):

- interpretation
- previously analysed or researched work
- unsubstantiated evidence
- historical accounts
- dictionaries
- websites
- personal reviews

Tertiary sources can include but are not limited to a mixture of both primary and secondary sources.

Learners will also need to understand that research can be qualitative or quantitative to include but not limited to:

Qualitative research:

- video recordings
- tape recordings
- note taking that can be transcribed at a later date (eg minutes)
- word process documents
- database files or index cards capable of being sorted
- interviews - that can often generate meaningful and detailed data such as current trends, understandings or concepts
- avoiding biased questioning or questionnaires

Quantitative research:

- spreadsheet data
- graphical representations
- data recorders
- polls
- data mining

- verified historical data

## Learning outcome:

### 2. Determine the techniques used to collect data for analysis

#### Topics

- 2.1 Use a methodical approach to data collection
- 2.2 Verifying data reliability and integrity
- 2.3 Ethical behavior in the collection of data

##### Topic 2.1

Learners should understand that a methodical approach towards the collection and analysis of data involves the application of various research tools that can include but are not limited to:

##### Summary:

Data collection can involve the collation of large amounts of data. It may be possible to partially analyse data prior to storage but in any event where there are numerous interviews, observation notes, field notes or numerical data, consideration should be given to creating a summary of the data concerned. Summarised data can be readily reviewed when it is being analysed at the conclusion of a project or research ensuring that any meanings are interpreted correctly.

Documented data can be sorted under common issues, ages of participants or themes, while numerical data can be summarised as averages, graphs or frequencies.

##### Standardisation:

When summarising data it is best to use a consistent format for recording any research (eg style, keywords, referencing etc). Data that has been standardised correctly is more readily accessible and can better support any conclusions as there is less likelihood of data being overlooked.

##### Topic 2.2

Learners need to be aware that any data gathered for the purpose of producing information must be from reliable sources and unbiased. Confirming the integrity and reliability of data can include but is not limited to:

- verifying sources of data
- preventing unbiased inferences
- preventing the repetition of source data
- using the correct data collection method
- analysing data fairly and accurately
- identifying differences between groups or subgroups (eg age ranges)
- creating an audit trail of all data and sources.

##### Topic 2.3

Learners need to be aware that in order not to compromise any outcomes, the collection of data must be gathered in an ethical manner, including but not limited to:

- preventing exclusion
- selective groups
- pre-judging outcomes
- altering or changing data (eg massaging)
- unbiased approaches to data collection
- conformity to legislation

- plagiarism.

## Learning outcome:

### 3. Determine how to present the results from data analysis

#### Topics

- 3.1 Reporting the findings of analysis
- 3.2 Formatting reports
- 3.3 The importance of a bibliography

#### Topic 3.1

Learners must be given the opportunity to explore reporting the outcomes from analysis for both qualitative and quantitative research. Reports must draw conclusions based on effective analysis including but not limited to:

- not basing conclusions on assumptions or bias
- verifying the sources of all data
- including where applicable any groups or sub-groups
- using accepted norms of analysis
- clearly defining the objectives of the research
- defining the measurements used to justify any conclusions
- not misinterpreting any findings during research
- applying honesty and integrity when reporting

The reports themselves could be for:

- reports
- conference submissions
- presentations
- thesis
- management information
- decision making
- analytical surveys

Reports could support information such as:

- tables
- spreadsheets
- graphs
- 

#### Topic 3.2

Learners should learn how to generate reports for both qualitative and quantitative research that fully reflect the findings of analysis, being presented in a clear and informative way. The reports formatting could include but are not limited to:

- consistent numbering
- consistent styling
- related diagrams or graphs with understandable axis
- be descriptive to aid understanding
- be written in an academic style (eg not in the first person)



- reflecting the number of sources of data used
- data tables
- images in the text or as appendices
- highlight any data not able to be included to avoid misinterpretation
- statistical data
- non-statistical data

### Topic 3.3

Learners need to recognise the requirement to attribute any other persons work, statements or research. This is usually achieved by the inclusion of a bibliography (eg Harvard) that lists any quotations, books, magazines or Internet sources used in a research project. Failure to do so could breach copyright or other ethical or moral guidelines.

## Learning outcome:

### 4. Perform collection and analysis of data

### Topics

- 4.1 Investigate data requirements for a given purpose
- 4.2 Collect verified data for analysis
- 4.3 Report on analysis outcomes

### Topics 4.1 – 4.3

Learners should be able transfer the knowledge gained from learning outcomes 1-3 for a practical scenario. Learners should explore a range of criteria for differing purposes including qualitative and quantitative research.

Having undertaken collection of data, learners should use a suitable technique/approach to analyse data in order to make judgements and report their findings using a clear, unbiased and consistent style. Learners should be encouraged to demonstrate the analytical basis for their findings, the validity of their sources and the reasoning behind any conclusion reached.

## Guidance for delivery

The content of this unit is intended to give the learner an opportunity to develop the skills necessary to effectively research any given subject.

In performing research for any of the other units (eg a feasibility study) learners will naturally put into practice the concepts and techniques for the collection and analysis of data.

This unit would be best delivered alongside Project Management where client or user requirements can be researched and documented.

## Suggested learning resources

### Books

Data Collection and Analysis  
 Roger Sapsford, Victor Jupp, 2006  
 Sage  
 ISBN-13: 978-0761943631

Responsible Conduct of Research  
Shamoo, A.E., Resnik, B.R. (2003)  
Oxford University Press.  
ISBN 13: 9780195368246

Qualitative research and evaluation methods (3rd ed.).  
Patton, M. Q. (2002).  
Sage.  
ISBN 13: 978-0761919711

Designing and conducting mixed methods research.  
Creswell, J. W., & Clark, V. L. P. (2007).  
Sage.  
ISBN-13: 978-1412975179

### **Websites**

[http://nnlm.gov/evaluation/workshops/measuring\\_your\\_impact/DataCollectionHandout.pdf](http://nnlm.gov/evaluation/workshops/measuring_your_impact/DataCollectionHandout.pdf)

<http://www.preservearticles.com/201104125345/methods-of-collecting-primary-data-in-statistics.html>

<b>UAN:</b>	M/506/5056
<b>Level:</b>	3
<b>GLH:</b>	30

**What is this unit about?**

The purpose of this unit is for learners to explore the various tools typically available to promote business enterprise through the Internet. These tools include but are not limited to social media, e-commerce, blogs, internet etc. It is about how these can be used along with the main components of enterprise for specific purposes.

Learners may be introduced to this unit by asking themselves questions such as:

- What is enterprise technology?
- How is enterprise technology regulated?
- What are the main components of enterprise technology?
- How is enterprise technology changing the way business is conducted?

Areas for exploration will include the shift from physical outlets towards online ordering and supplying (e-commerce).

**Learning outcomes**

In this unit, learners will be able to:

1. identify tools and components that can be used for enterprise technology
2. determine how online financial transactions can be carried out and the associated regulations

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

**Please note** that the supporting bullet points throughout this unit are not definitive.

## Learning outcome:

### 1. Identify tools and components that can be used for enterprise technology

## Topics

- 1.1 Online tools that can be used for enterprise technology
- 1.2 Enterprise technology **components** and how they can be used

### Topic 1.1

Learners should understand that enterprise technology is the process of gathering information and personal data that enables different tools to be used to target marketing of products related to the individual. This enables businesses to increase turnover based upon the information gathered and reduced business overheads eg reduced presence in the high street (lower rents), less stock required, informed planning and improved logistics.

Learners must have an understanding of how online and mobile analytical tools can contribute towards the following, including but not limited to:

#### Tools:

- Social networks
  - Targeted advertising
  - Approved content and recommendation eg 'like', '+1'
- Blogs
- Forums
- E-Commerce sites
- Smartphones
- Apps
  - In Apps Purchases
- Information management systems
- Customer Relation Management (CRM) systems
- Search engines
  - Browser history
  - Cookies
  - Aggregation tools that pull data from multiple sources to create buyer/user profiles

### Topic 1.2

Learners must have an understanding of how the following enterprise technology components are used, including but not limited to:

#### Components:

- CRM systems
  - recording all contacts with customers
  - storing customer's details
  - retrieving customer's information
  - targeted e-mails
- database driven websites
- social media and search engines
  - sponsored links

- pay per click
- pop-ups
- data mining
  - loyalty cards use
    - spending history
    - targeted promotion
  - business development
  - informed planning
  - logistics
  - audit trail
- mobile apps
- bluetooth messaging
- integration of all the above using cloud platforms
- the importance of identity online and identity relationship management

## Learning outcome:

**2. Determine how online financial transactions can be carried out and the associated regulations**

## Topics

- 2.1 **Direct payment methods** accepted for enterprise technologies
- 2.2 **Indirect payment methods** accepted for enterprise technologies
- 2.3 **Regulations** relating to payments

### Topics 2.1, 2.2

Learners must have an understanding how online financial transactions are conducted. learners must have an understanding of the following methods of payment including but not limited to:

#### Direct methods of payment:

- credit card payment
- debit card payments
- credit accounts
  - shopping basket

#### Indirect methods of Payment:

- Escrow (governed by Financial Services Authority - FSA)
- 3rd party services
  - payment on delivery

### Topic 2.3

Learners must be aware of the following regulations and how they apply to purchase of goods and/or services online in order to demonstrate compliance, including but not limited to:

#### Regulations:

- Sales of Goods Act 1979
- Distance Selling Regulations 2000
- Consumer Credit Act 1974
- Unfair Terms in Consumer Contract Regulations 1999
- E-Commerce Regulations 2002
  - Information that must be supplied
  - Electronic Signature Regulations 2002
- Data protection Act 1998

## Guidance for delivery

This unit can be delivered alongside many of the other units. It could be used as the foundation for a Learner's project and would help provide the underpinning knowledge required for the learner to complete their other work.

A typical project could include the creation of a website, the promotion of the website through different mediums and the ability for payments to be taken online.

## Suggested learning resources

### **Data Protection: A Practical Guide to UK and EU Law      Carey P**

Published By: Oxford University Press, 2009

ISBN-10 0199563543

Selling online - an overview of the rules: <http://www.out-law.com/page-424>

Consumers Rights: <http://www.which.co.uk/consumer-rights/regulation>

## Appendix 1      Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on [www.cityandguilds.com](http://www.cityandguilds.com).

### ***City & Guilds Centre Manual***

This document provides guidance for organisations wishing to become City & Guilds approved centres, as well as information for approved centres delivering City & Guilds qualifications. It covers the centre and qualification approval process as well as providing guidance on delivery, assessment and quality assurance for approved centres.

It also details the City & Guilds requirements for ongoing centre and qualification approval, and provides examples of best practice for centres. Specifically, the document includes sections on:

- the centre and qualification approval process
- assessment, internal quality assurance and examination roles at the centre
- registration and certification of candidates
- non-compliance and malpractice
- complaints and appeals
- equal opportunities
- data protection
- management systems
- maintaining records
- internal quality assurance
- external quality assurance.

### ***Our Quality Assurance Requirements***

This document explains the requirements for the delivery, assessment and awarding of our qualifications. All centres working with City & Guilds must adopt and implement these requirements across all of their qualification provision. Specifically, this document:

- specifies the quality assurance and control requirements that apply to all centres
- sets out the basis for securing high standards, for all our qualifications and/or assessments
- details the impact on centres of non-compliance

The **centre homepage** section of the City & Guilds website also contains useful information on

**Walled Garden:** how to register and certificate candidates on line

**Events:** dates and information on the latest Centre events

**Online assessment:** how to register for e-assessments.





## Useful contacts

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### UK learners

General qualification information

**E: [support@cityandguilds.com](mailto:support@cityandguilds.com)**

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### International learners

General qualification information

**E: [intcg@cityandguilds.com](mailto:intcg@cityandguilds.com)**

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### Centres

Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results

**E: [centresupport@cityandguilds.com](mailto:centresupport@cityandguilds.com)**

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### Single subject qualifications

Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change

**E: [singlesubjects@cityandguilds.com](mailto:singlesubjects@cityandguilds.com)**

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### International awards

Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports

**E: [intops@cityandguilds.com](mailto:intops@cityandguilds.com)**

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### Walled Garden

Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems

**E: [walledgarden@cityandguilds.com](mailto:walledgarden@cityandguilds.com)**

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### Employer

Employer solutions, Mapping, Accreditation, Development Skills, Consultancy

**E: [business@cityandguilds.com](mailto:business@cityandguilds.com)**

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If you have a complaint, or any suggestions for improvement about any of the services that we provide, email: **[feedbackandcomplaints@cityandguilds.com](mailto:feedbackandcomplaints@cityandguilds.com)**

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## About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

## City & Guilds Group

The City & Guilds Group is a leader in global skills development. Our purpose is to help people and organisations to develop their skills for personal and economic growth. Made up of City & Guilds, City & Guilds Kineo, The Oxford Group and ILM, we work with education providers, businesses and governments in over 100 countries.

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