

Qualification specification

T Level Technical Qualification in Digital Business Services

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Qualification Specification

Digital Business Services

603/6902/4

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Section 1: Introduction

A T Level¹ is a composite technical study programme, aimed at preparing young people for work, higher level apprenticeships or higher education (HE). It comprises 5 key components:

- an approved technical qualification (TQ), which includes the opportunity to specialise in at least one occupational role
- a substantial industry placement with an external employer (further information regarding the required number of hours can be found in Section 2 of this TQ specification)
- English, mathematics and digital requirements; students will have to achieve a minimum of level 2 English and mathematics in order to achieve a T Level (with some flexibility for students with special educational needs or disabilities (SEND))
- employability, enrichment and pastoral (EEP) elements
- in some cases, it may also include mandatory additional requirements (MAR), such as important licence to practise qualifications

The T Level Technical Qualification in Digital Business Services forms part of the new T Level in digital business services. The outline content has been produced by T Level panels based on the same standards as those used for apprenticeships. The outline content formed the basis of this qualification and has been further developed by NCFE.

This qualification has 2 components:

- route core component
- occupational specialism component:
 - Data Technician

The route core component provides a high-level foundation of knowledge and skills that are relevant to the occupational specialism. This is to ensure fairness for all students, and to support learning in their chosen occupational specialism component. Some of the core topics and ideas are then broken down and contextualised in more detail in the occupational specialism, allowing the student to apply the knowledge and skills in their own specific context.

The occupational specialism component covers the knowledge, understanding, skills and behaviours required to achieve threshold competence in a chosen occupational specialism. Threshold competence refers to the level of competence deemed by employers as sufficient to secure employment in roles relevant to an occupational specialism. Achievement of threshold competence signals that a student is well-placed to develop full occupational competence, with further support and development, once in work.

English, mathematics and digital skills have also been embedded throughout the TQ and must be taught when highlighted in the content.

¹ T Level is a registered trade mark of the Institute for Apprenticeships and Technical Education

About this TQ specification

To ensure that you are using the most up-to-date version of this TQ specification, please check the version number and date in the page footer against that of the TQ specification on the NCFE website.

If you advertise this qualification using a different or shortened name, you must ensure that students are aware that their results will state the full regulated qualification title.

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- you may copy and paste any material from this document; however, we do not accept any liability for any incomplete or inaccurate copying and subsequent use of this information
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- the resources and materials used in the delivery of this qualification must be age-appropriate and due consideration should be given to the wellbeing and safeguarding of students in line with your safeguarding policy when developing or selecting delivery materials

Specification updates and amends

All content held within this specification is correct at the time of publication and will be subject to assessment within the respective academic session. An updated version of the specification will be published annually, ensuring that the knowledge and skills held within it reflect current subject practice and provide students with the relevant threshold competence to progress into industry.

Where essential updates are required based on significant changes within the sector, updates to the specification may be made during an academic session. Providers will be made aware of the publication of any new versions of the specification and the nature of the changes via the T Level monthly updates.

It is the responsibility of delivery staff to ensure that content being delivered to students is reflective of the sector and the most recently published version of the specification.

Section 2: Summaries

Technical qualification summary

Qualification title

T Level Technical Qualification in Digital Business Services

Qualification number (QN)

603/6902/4

Aim reference

60369024

Qualification level

3

Guided learning hours (GLH) and total qualification time (TQT)

	GLH for delivery	GLH for assessment	Total GLH	TQT
Route core component	495	19	514	566
Occupational specialism	571	29	600	660
Total			1114	1226

The GLH shown above only include time for the technical qualification element of the T Level programme; they do not include time allocated for the additional components of the T Level programme.

Minimum age

T Level technical qualification students must be a minimum of 16 years of age.

Qualification purpose

The purpose of the T Level Technical Qualification in Digital Business Services is to ensure students have the knowledge and skills needed to progress into skilled employment or higher level technical training relevant to the T Level.

Objectives

The objectives of this qualification are to equip students with:

- the core knowledge and skills relevant to digital business services
- up-to-date occupational knowledge and skills that have continued currency amongst employers and others
- the necessary English, mathematics and digital skills
- threshold competence that meets employer expectations and is as close to full occupational competence as possible
- opportunities to manage and improve their own performance

Industry placement experience

Industry placements are intended to provide students with the opportunity to develop the knowledge, skills and behaviours required for skilled employment in their chosen occupation and which are less easily attainable by completing a qualification alone.

As part of achieving the overall T Level programme, students are required to complete a minimum of 315 hours industry placement.

It is the provider's responsibility to ensure the minimum number of hours is undertaken by the student.

There may be specific requirements for providers and employers to consider prior to the student commencing a work placement. Please see the industry placement guidance from the Institute for Apprenticeships and Technical Education.

There are specific requirements for providers and employers relating to the insurance of students in the workplace. Further information about insurance can be found at www.abi.org.uk or www.hse.gov.uk.

Rules of combination

Students are required to complete:

- the core component
- the occupational specialism component

Grading

Component	Grade
Core component	A* to E and U
Occupational specialism component	Distinction/merit/pass and ungraded

Assessment method

Core component:

- 2 written examinations
- Employer set project (ESP)

In order to achieve a grade for the core component, students must have results for both sub-components (the core (written) examination and the ESP).

The combined results from these sub-components will be aggregated to form the overall core component grade (A*–E and U).

If students fail to reach the minimum standard across all sub-components, they will receive a U grade. No overall grade will be issued for the core component until both sub-components have been attempted.

Occupational specialism component:

- synoptic assignment

The student is also required to successfully achieve a distinction/merit/pass grade in the occupational specialism component. If the student fails to reach the specified level of attainment, they will receive a U grade.

Progression including job roles (where applicable)

Students who achieve this qualification could progress to the following:

- employment:
 - data technician roles
- higher education
- apprenticeship (progression onto lower level apprenticeships may also be possible in some circumstances, if the content is sufficiently different)

UCAS

The T Level study programme is eligible for UCAS points. Please check the UCAS website for more information.

Regulation information

This is a regulated qualification. The regulated number for this qualification will be completed following Ofqual accreditation.

Funding

This qualification is eligible for funding. For further guidance on funding, please contact the Education and Skills Funding Agency (ESFA).

English, mathematics and digital content

English, mathematics and digital content are embedded and contextualised within the digital business services content. This content must be taught to all students and will be subject to assessment.

Entry guidance

This qualification is designed for post-16 students.

There are no specific prior skills/knowledge a student must have for this qualification. However, students would be expected to have a level 2 qualification or equivalent.

Providers are responsible for ensuring that this qualification is appropriate for the age and ability of students. Providers must make sure that students can fulfil the requirements of the route core and occupational specialism and comply with the relevant literacy, numeracy, digital and health and safety aspects of this qualification.

Students registered on this qualification should not undertake another qualification at the same level with the same or a similar title, as duplication of learning may affect funding eligibility.

T Level Transition programme

The T Level Transition Programme (TLTP) is a new one-year, 16 to 19, level 2 study programme, which provides a high-quality route on to T Levels. It is designed for those students with T Level aspirations, who would benefit from the additional study time, preparation and support the programme provides, to help them progress on to a T Level.

There is a TLTP for each T Level Technical Education route, rather than individual T Levels or occupational specialisms, to provide a broad introduction to the industry-relevant knowledge, practical, transferable and employability skills and behaviours, relevant to a student's chosen T Level subject area. The programme consists of interrelated components including English, maths and digital; technical knowledge and skills; experience of the workplace; and wider support and personal development. Together, these components complement and reinforce learning and development.

The National Technical Outcomes have been developed for each route, to set out the minimum students are expected to cover in the technical component of the programme. The National Technical Outcomes have been developed with close reference to T Level outline content and the T Level Technical Qualification specifications so that they provide a stepping stone to T Level, appropriate to level 2.

The T Level Transition programme is being introduced alongside T Levels. More information on the T Level Transition Programme can be found on the government's website: www.gov.uk

Registering students on T Levels

We expect students to make a decision about their T Level pathway within the first few weeks of their course, supported by good information, advice and guidance from their provider. For example, a student might know that they want to do a Digital T Level, but not be clear at the outset whether that should be Digital Production, Design and Development; Digital Support Services; or Digital Business Services. If a provider is offering 2 or 3 of the available pathways, there may be some co-delivery or other activity in the first few weeks which provides students with the opportunity to find out about different occupations (for example, through employer visits). A student's chosen T Level pathway and OS should be recorded on the Individual Learner Record (ILR) or School Census in October of year 1.

To ensure there is sufficient time to cover the curriculum, decisions about OSs should be confirmed by the end of the first year, although this could be much earlier depending on a provider's curriculum model. For example, some providers start teaching the OS early on in the first year and require students to make a decision about this at the start of their course, whereas other providers may only start teaching OSs in the second year. In order to ensure that providers receive the right level of funding, a student's OS must be confirmed in the final data return of year 1 (ILR R14/Autumn Census), although changes after this date are possible.

Providers will also need to ensure that they register their students on the TQ with the awarding organisation and enter them for assessments as relevant.

Transferring between T Levels and occupational specialisms (OSs)

We expect some students to switch between T Levels. Providers should consider the degree of overlap between the 2 T Levels and the remaining time before any assessments in determining if a transfer is possible – or whether a student will need to restart their T Level. Attainment from one T Level cannot count towards another, and all students will need to take and pass the relevant assessments in order to pass their T Level.

Some students may also want to switch to a different OS within the same T Level pathway, including in the second year. It is less likely that there will be any overlap between OSs, so any decision will depend on the provider's curriculum model and the stage a student has reached in their OS learning. Any changes to a student's T Level – whether pathway or OS – should be recorded on the ILR/Census as soon as possible and should also match the registration and assessment entries submitted to the relevant awarding organisation.

Achieving this qualification

To achieve this qualification, the student must successfully demonstrate their achievement of the core component and one occupational specialism component.

In order to achieve a grade for the core component, the student must attempt both the external examination (paper A and paper B) and ESP sub-components. The results from these will be aggregated to form the overall core component grade (A* to E and U). If students do not attempt one of the sub-components, an overall component grade will be withheld pending the attempt of both. If students fail to reach the minimum standard across sub-components after attempting both, they will receive a U grade for the component.

The student is required to successfully achieve a distinction/merit/pass grade in one of the occupational specialism components. If the student fails to reach the specified level of attainment, they will receive a U grade.

Retakes

Core component retakes

There is the opportunity for students to retake the core assessments in order to improve their marks. This includes:

- 2 written examinations
- ESP

The core component's written examination is made up of 2 papers. If the student wants to retake the written examination assessment, they must retake both papers, in the same series.

Students can retake the core components in different series, meaning they could sit the ESP in one series and the core exams (both exam papers to be taken in the same series) in the next. There is no limit to the number of retakes a student can complete. However, any retake must be completed within 2 years after the completion of the student's T Level programme.

When determining each student's overall achievement for the core component, the highest achievement in each core assessment (written examination and ESP) is used.

Occupational specialism component retakes

Although retakes are permitted for the occupational specialism, it is unlikely that students will be able to fit a retake opportunity into the delivery timetable.

If a retake opportunity is scheduled, the student must retake all synoptic assignments for the occupational specialism. There will be one opportunity per year to sit the occupational specialism, meaning a retake of the occupational specialism would be sat in the next academic year of study.

There is no limit to the number of retakes a student can complete. However, any retake must be completed within 2 years after the completion of the student's T Level programme.

Technical qualification components

Component	Level	Content
Route core component	3	<ol style="list-style-type: none"> 1. Business context 2. Culture 3. Data 4. Digital analysis 5. Digital environments 6. Diversity and inclusion 7. Learning 8. Legislation 9. Planning 10. Security 11. Testing 12. Tools

Students are required to complete the occupational specialism component.

Component	Level	Content
Occupational specialism (Data Technician)	3	<ul style="list-style-type: none"> • Performance outcome 1: Source, organise and format data securely in a relevant way for analysis • Performance outcome 2: Blend data from multiple sources • Performance outcome 3: Analyse structured and unstructured data to support business outcomes • Performance outcome 4: Interpret data and communicate a result appropriate to the audience • Performance outcome 5: Can apply legal, ethical and professional principles when manipulating data • Performance outcome 6: Discover, evaluate and apply reliable sources of knowledge

Employer involvement

The outline content for this qualification was devised by T Level panels. The panels consisted of employers and industry stakeholders.

We have worked in partnership with employers and other stakeholders to elaborate the content further, create the assessments and set the standards to ensure students achieve the level of competence needed to enter skilled employment.

Progression to higher level studies

This qualification aims to provide students with a number of progression options, including higher level studies at university or further education (FE) colleges. The skills required to progress to higher academic studies are different from those required at levels 1 and 2. Level 3 qualifications enable the development of these skills. Although there is no single definition of higher level learning skills, they include:

- checking and testing information
- supporting points with evidence
- self-directed study
- self-motivation
- thinking for yourself
- analysing and synthesising information/materials
- critical thinking and problem solving
- working collaboratively
- reflecting upon learning and identifying improvements
- presenting information in written and verbal formats

Level 3 criteria can require students to analyse, draw conclusions, interpret or justify, which are all examples of higher level skills and support progression and further learning. If you need any further information, please refer to the NCFE website.

How the qualification is assessed

Assessment is the process of measuring a student's skill, knowledge and understanding against the standards set in a qualification.

The core component is 100% externally assessed. External assessments are set and marked by NCFE. The external examinations and ESP will assess students' core knowledge, understanding and skills relevant to the occupations within the digital business services TQ. Students may be entered for any assessment window of the core component assessments that is most appropriate for them, although in the case of the core external examinations, they must take the 2 examinations in the same sitting.

The occupational specialism component is also externally assessed through synoptic assignments. These synoptic assignments will assess the knowledge, understanding, skills and behaviours required to achieve threshold competence in the student's occupational specialism.

Providers must not give any feedback to the student about their performance in any of the externally assessed components or elements.

The assessment consists of:

- core component:
 - written examinations
 - ESP
- occupational specialism component:
 - synoptic assignments (specific to occupational specialism)

Assessment of English, mathematics and digital

The TQ outline content has been reviewed against the general competency frameworks for English, mathematics and digital (EMD). The resulting mapping document is contained in section 3.

For the purposes of the core tests, English skills will be assessed through the students' ability to convey ideas precisely and accurately, and be referred to as quality of written communication (QWC).

Quality of written communication (QWC)

Quality of written communication is assessed within targeted marks for the core examinations and is embedded throughout the assessment objectives within the ESP. No specific marks are available within the occupational specialism; however, a good command of communication and written work is anticipated for success at this level.

Application of mathematics, significant figures and decimal places

Throughout the core examinations for all pathways, students will be assessed on their understanding and application of mathematics. Some questions may require answers to be given to a number of significant figures or a given number of decimal places.

A paper may contain marks that are dependent on students giving final answers to a specified number of significant figures or decimal places. A significant figure mark may not be awarded for an answer given in surd form. In questions where the command word is 'calculate' and the final answer is required in either format, the question should be calculated to at least one additional significant figure or decimal place before giving the final answer as requested in the question.

In all cases where an answer is required to a number of significant figures or decimal places, this will be specified in the question.

Digital skills

Digital skills are expected to be naturally occurring in the ESP and occupational specialism; marks are allocated where they are deemed to occur naturally in the completion of the task.

Rationale for synoptic assessment

Synoptic assessment tests students' understanding of the connections between the topics covered across the performance outcomes within the occupational specialism.

Synoptic assessment enables students to integrate and apply knowledge, understanding and skills with breadth and depth. It also requires them to demonstrate their capability to apply knowledge, understanding and skills across the occupational specialism.

Scheme of assessment for each component

Each component in the core is worth the following weighting:

	% weighting of the core component
Paper A	35
Paper B	35
Sub-total	70
ESP	30
Total	100%

External examinations (core)

Overview of assessment

Paper A

Written examination

Duration: 2 hours

100 marks (plus 6 marks for quality of written communication) = 106 marks total

This paper covers 50% of the core knowledge and understanding

This paper is composed of 3 sections which may consist of multiple-choice, short-answer and extended writing questions:

- Section A: 38 to 44 marks
- Section B: 36 to 42 marks
- Section C: 20 to 26 marks

Paper B

Written examination

Duration: 2 hours

100 marks (plus 6 marks for quality of written communication) = 106 marks total

This paper covers 50% of the core knowledge and understanding

This paper is composed of 3 sections which may consist of multiple-choice, short-answer and extended writing questions:

Section A: Tools and testing: 18 to 24 marks

Section B: Legislation and security: 34 to 40 marks

Section C: Digital analysis and data: 40 to 46 marks

Content subject to assessment

- Paper A – route core elements: 1, 2, 5, 6, 7, 9
- Paper B – route core elements: 3, 4, 8, 10, 11, 12

Assessment objectives and weightings

The external (core) examinations will assess how students have achieved the following assessment objectives (AOs).

	Objective	Weighting*
AO1	Demonstrate knowledge and understanding of the digital business services sector	28%

AO2	Apply knowledge and understanding of the digital business services sector to different situations and contexts	40%
AO3	Analyse and evaluate information and issues related to the digital business services sector	32%

*Both paper A and paper B allocate 6 marks to the quality of written communication (QWC). These marks are bolted on and do not impact on the AO weightings. For example, paper A totals 106 marks of which the AO weightings apply to a total of 100 marks, with the remaining 6 assessing QWC.

Total marks

Paper		Assessment length	% weighting of the core component	Maximum raw mark	Max UMS
External examinations	Paper A	2 hours	35%	106	280
	Paper B	2 hours	35%	106	

AOs	Paper A	Paper B	Total
AO1	28 marks (14%)	28 marks (14%)	56 marks (28%)
AO2	40 marks (20%)	40 marks (20%)	80 marks (40%)
AO3	32 marks (16%)	32 marks (16%)	64 marks (32%)

QWC	6 marks	6 marks	12 marks
Total	106 marks	106 marks	212 marks

The table above shows how the core examination will target the AOs in this qualification. Each version of the core examination will adhere to these mark and percentage weightings. Both paper A and paper B allocate 6 marks to the quality of written communication (QWC). These marks are bolted on and do not impact on the AO weightings.

Assessment availability

There will be 2 assessment opportunities per year in summer (May/June) and autumn (November/December). Please refer to the Key Dates Schedule on the NCFE website for further information.

Assessment conditions

The core external examinations must be invigilated.

All students' scripts must be submitted to NCFE for marking. All assessment material must be securely stored by the approved provider. On-screen assessments will be submitted through the online assessment platform.

Please refer to the regulations for the conduct of external assessments for further information on the assessment conditions. Please refer to the NCFE website for an up-to-date copy of the regulations.

Employer set project (core)

Overview of assessment

Externally set (in conjunction with employers) project

The purpose of the employer set project (ESP) is to ensure that students have the opportunity to apply core knowledge and skills to develop a substantial piece of work in response to an employer set brief. The brief and tasks are contextualised around an occupational area and chosen by the student ahead of the assessment window.

To achieve the AOs and meet the brief, the student must demonstrate the following core skills (CS):

CS1	Working with stakeholders to clarify and consider options to meet requirements
CS2	Research and investigate relevant sources and data to meet requirements
CS3	Apply a valid approach to solving data problems, identifying and resolving issues whilst recording progress and solutions to meet requirements
CS4	Ensure that actions identify and mitigate risk to security
CS5	Communicate information clearly to technical and non-technical stakeholders
CS6	Reflect and evaluate their own performance and understand the need for continuous learning and development

The knowledge requirements will be taken from the core knowledge relevant to the brief; the briefs will change for each assessment window.

Duration: 15 hours (assessed)*

*The ESP also includes a non-assessed, pre-release task which has no time limit constraints. However, submission controls are applicable as detailed in the provider guide.

Subject content to be assessed

Content subject to assessment – route core elements 1 to 12

- core skills assessment objectives and core knowledge

Core knowledge and core skills relevant to the brief will be covered in the ESP; this will change for each assessment window.

Core skills

In completing the employer set project (ESP), the student will demonstrate 6 core skills, supported by underpinning knowledge and understanding set out in the route core component.

CS1	Working with stakeholders to clarify and consider options to meet requirements
CS2	Research and investigate relevant sources and data to meet requirements
CS3	Apply a valid approach to solving data problems, identifying and resolving issues whilst recording progress and solutions to meet requirements
CS4	Ensure that actions identify and mitigate risk to security
CS5	Communicate information clearly to technical and non-technical stakeholders
CS6	Reflect and evaluate their own performance and understand the need for continuous learning and development

	Objective	Weighting*
AO1	Plan their approach to meeting the project brief	8 marks (10%)
AO2	Apply core knowledge and skills to business and data analytics	40 marks (50%)
AO3	Select relevant techniques and resources to meet the brief	16 marks (20%)
AO4	Use English, mathematics and digital skills as appropriate	8 marks (10%)
AO5	Realise a project outcome and review how well the outcome meets the brief	8 marks (10%)

Task	AO1	AO2	AO3	AO4	AO5	Marks per task
1	8	4	4	2		18
2a		8	4			12
2b		16	4			20
3		12	4	6		22
4					8	8
Marks per AO	8	40	16	8	8	80 marks
Total % of marks per AO	10%	50%	20%	10%	10%	100%

Assessment availability

There will be 2 assessment opportunities per year in summer (May/June) and autumn (November/December). Please refer to the Key Dates Schedule on the NCFE website for further information.

Assessment conditions

All tasks must be completed under supervised conditions. This means students can access resources in order to complete their assessment.

The approved provider must securely retain all students' evidence and submit that evidence to NCFE for marking.

Please refer to the regulations for the conduct of external assessments for further information on the assessment conditions. Please refer to the NCFE website for an up-to-date copy of the regulations.

Uniform mark scale (UMS)

The core component is modular, which means that a student can take and retake the assessments in different assessment windows. Assessments may vary slightly in levels of difficulty and, therefore, the mark that represented a C grade in the external examination in one assessment window may not be appropriate in the following assessment window.

To address this, we convert raw marks to uniform marks. The uniform mark scale (UMS) also allows us to account for the relative weighting of the assessment to the qualification as a whole. The maximum UMS points available for each assessment, and the UMS points relating to each grade boundary, are fixed. These are shown in the following table:

Grade boundary	External examination	Employer set project	Overall
Max	280	120	400
A*	252	108	360
A	224	96	320
B	196	84	280
C	168	72	240
D	140	60	200
E	112	48	160
U	0	0	0

The external examination comprises 2 papers, the results of which are combined before conversion to UMS. Combined grade boundaries for each series will be set by adding together the equivalent boundaries for each paper.

The raw mark grade boundaries are set after each assessment window. NCFE sets these boundaries judgements, following both qualitative and quantitative analysis, and then converts them to UMS.

Although the raw mark grade boundaries in assessment window 1 and assessment window 2 are different, they have the same value in terms of UMS marks (for example, 168 for a C and 196 for a B) when contributing to the qualification as a whole. NCFE will publish the raw mark grade boundaries following the completion of each assessment window.

Synoptic assignments (Data Technician)

Synoptic assignment comprising 4 tasks.

Duration: 29 hours

Consisting of:

Task 1: 5 hours

Task 2: 10 hours

Task 3: 8 hours

Task 4: 6 hours

Content subject to assessment

All performance outcomes within a chosen occupational specialism are subject to assessment:

- Performance outcome 1: Source, organise and format data securely in a relevant way for analysis
- Performance outcome 2: Blend data from multiple sources
- Performance outcome 3: Analyse structured and unstructured data to support business outcomes
- Performance outcome 4: Interpret data and communicate a result appropriate to the audience
- Performance outcome 5: Can apply legal, ethical and professional principles when manipulating data
- Performance outcome 6: Discover, evaluate and apply reliable sources of knowledge

Assessment weightings

Task	% weighting of the occupational specialism	Max raw mark	Scaling factor*	Maximum scaled mark
Task 1	20%	40	1.067	42.667
Task 2	45%	52	1.846	96.000
Task 3	20%	40	1.067	42.667
Task 4	15%	32	1.000	32.000
Total	100%	164 marks		213

Total marks

164

*Scaled marks for assignments are calculated by multiplying the raw assessment mark with the scaling factor. Scaled marks up to 3 decimal places are combined before being rounded to the nearest whole number. The same approach is used to determine overall combined grade boundaries from assignment grade boundaries.

Assessment availability

There will be one assessment opportunity per year from summer 2023. Please refer to the Key Dates Schedule on the NCFE website for further information.

Assessment conditions

All tasks must be completed under specified conditions. See the tutor guidance in the tutor guidance pack for more detail.

The approved provider must securely retain all students' evidence and submit that evidence to NCFE for marking.

Please refer to the regulations for the conduct of external assessments for further information on the assessment conditions. Please refer to the NCFE website for an up-to-date copy of the regulations.

Core written examinations

The core written examinations will be available as onscreen and as paper-based examinations. A different version of each examination will be available per mode.

The ESP and the occupational specialism assessments will be released and accessed by providers electronically. The submission of any assessment evidence from providers will also be digital and provided to NCFE electronically, unless otherwise specified.

For instructions on conducting external assessments (including information on malpractice/maladministration), please refer to our regulations for the conduct of external assessments and qualification specific instructions for delivery documents, which are available on the NCFE website.

Sample assessment materials

Sample assessment materials can be found on the qualification page on the NCFE website.

Results

Results for each component will be released in accordance with the assessment windows. Please refer to the assessment windows on the NCFE website for further information.

Enquiries about results

If a provider believes a student's result is at variance with their reasonable expectations, they can submit an enquiry about a result in line with our enquiries about results and assessment decisions policy, which is available on the NCFE website.

Grading

Core component

The core component is graded A* to E and U.

Core component grade descriptors

Grade	Demonstration of attainment
A	A grade A student can:
	demonstrate relevant and comprehensive knowledge and understanding of a wide range of business contexts and issues
	apply knowledge and critical understanding to select relevant information from a wide range of sources to investigate business organisations and concepts in familiar and unfamiliar contexts, using a wide range of subject specific terminology
	use a range of relevant quantitative skills
	critically analyse and evaluate available information and evidence to make reasoned, substantiated judgements and conclusions, and, where appropriate, suggest viable recommendations for future activity
E	A grade E student can:
	demonstrate basic knowledge and understanding of some aspects of business contexts or issues
	apply, in a limited way, knowledge and understanding to investigate business organisations and/or contexts, using everyday language
	use some obvious, simple quantitative skills
	use and describe some information to draw basic lines of reasoning, make straightforward judgements and, possibly, offer simple suggestions for future activity

Occupational specialism components

The occupational specialism components are graded distinction, merit, pass and ungraded.

Occupational specialism grade descriptors

Grade	Demonstration of attainment
Pass	The evidence is logical and displays the basic knowledge and skills expected of an employee in this sector in the context of the set brief.
	The student demonstrates theoretical knowledge of the sources, foundations, usage and quality of data that is used for analysis. They are able to carry out routine administrative and analytical tasks using simple datasets.
	The student demonstrates an understanding of data blending techniques and is able to carry out routine data blending tasks.
	The student is able to give a simple explanation of how and why data is analysed by a business. They are able to follow the data process in order to build and test a dataset.
	The student is able to demonstrate understanding of visualisation and communication techniques. They are able to provide evidence of communicating data which is relevant to stated business objectives.
	The student is able to state legal and professional principles that are relevant to the manipulation of data. They are able to carry out routine tasks using data in a way that complies with relevant laws and professional standards.
	The student is able to explain how appropriate source of information can be selected and evaluated. They are able to search for relevant information and can assess the reliability of the knowledge that they generate.
Distinction	The evidence produced in response to the brief is precise and logical, displaying a secure grasp of the knowledge and skills that would be expected of a new recruit in the industry.
	The student demonstrates a thorough understanding of the sources, foundations, usage and quality of data that is used for analysis. They are able to carry out complex and non-routine administrative and analytical tasks with minimal supervision using both simple and complex datasets.
	The student demonstrates a secure understanding of a range of data blending techniques and is able to carry out both routine and non-routine data blending tasks competently.
	The student is able to demonstrate a detailed understanding of the reasons why a range of businesses might analyse data. They are able to use their own initiative to follow the data process with minimal supervision in order to build and test a complex dataset in response to a specified business problem.
	The student is able to demonstrate a detailed understanding of a range of visualisation and communication techniques that might be appropriate to a range of organisational needs. They are able to work collaboratively to communicate and visualise data, showing links to business objectives in the materials that they produce.

Grade	Demonstration of attainment
	The student is able to explain the legal and professional principles that are relevant to a range of different data manipulation tasks. They are able to consistently carry out both routine and non-routine tasks in a way that complies with legal requirements and professional standards.
	The student is able to give a detailed explanation of how to select and evaluate a range of different sources of information for a specific task. They are able to search for data that is appropriate to a given task and can corroborate their findings, using appropriate methods to evaluate the suitability of data and making appropriate recommendations for improvements in the collation of data for future tasks.

'Threshold competence' refers to a level of competence that:

- signifies that a student is well-placed to develop full occupational competence, with further support and development, once in employment
- is as close to full occupational competence as can be reasonably expected of a student studying the TQ in a classroom-based setting (for example, in the classroom, workshops, simulated working and (where appropriate) supervised working environments)
- signifies that a student has achieved the level for a pass in relation to the relevant occupational specialism component

U grades

If a student is not successful in reaching the minimum threshold for the core and/or occupational specialism component, they will be issued with a U grade.

Awarding the final grade for each component of the TQ

Each core component's marks will be combined to form the overall grade for the core component.

The marks from the occupational specialism assignment will form the occupational specialism grade.

These grades will be submitted to the Institute for Apprenticeships and Technical Education who will issue an overall grade for the T Level study programme.

Calculating the final grade for the T Level programme

To be awarded an overall T Level grade, a student must successfully pass both components of their TQ, complete an industry placement, achieve level 2 English and mathematics if they have not already achieved this prior to starting a T Level, and meet any other requirements set by the Institute's T Level panel. T Levels will vary in size, largely dependent on the size of the TQ, and on whether a student needs to continue to study English and mathematics.

The full list of Functional Skills/GCSE/other alternative qualifications which meet the English and mathematics requirement for T Levels, including details of flexibility for students with SEND, is published in the Specification of apprenticeship standards for England (SASE), which is available via the Department for Education's (DfE) website.

The overall grade for the T Level programme is based on a student's performance in the TQ and would reflect:

- the comparative size of the core component and the occupational specialism
- the grades achieved for the core component (A* to E) and the occupational specialism (P/M/D)

This grading approach also makes it possible to recognise exceptional achievement, through the award of an overall distinction* grade for students that achieve an A* for the core component and a distinction in their occupational specialism.

The following table shows how the core component and occupational specialism grades are aggregated to produce an overall result for this T Level programme:

Core component 50%/occupational specialism 50%:

		Occupational specialism grade		
		Distinction	Merit	Pass
Core component grade	A*	Distinction*	Distinction	Distinction
	A	Distinction	Distinction	Merit
	B	Distinction	Merit	Merit
	C	Distinction	Merit	Pass
	D	Merit	Merit	Pass
	E	Merit	Pass	Pass

Overall T Level grade

This matrix shows the overall TQ grade when both TQ components are combined. For example, if a student achieved a B grade in the core component assessment (indicated by the vertical column on the left) and a merit grade in the occupational specialism assessment (indicated by the horizontal top row), they would achieve a merit grade for the overall T Level programme:

		Occupational specialism grade		
		Distinction	Merit	Pass
Core component grade	A*	Distinction*	Distinction	Distinction
	A	Distinction	Distinction	Merit
	B	Distinction	Merit	Merit
	C	Distinction	Merit	Pass
	D	Merit	Merit	Pass
	E	Merit	Pass	Pass

Merit

Section 3: Frameworks

General competency framework

Technical qualifications are required to contain sufficient and appropriate English, mathematics and digital content to help students reach threshold competence in their chosen occupational specialism. As such, a framework of competencies has been developed which awarding organisations are required to use and embed in all technical qualifications (where appropriate).

General English competencies	General mathematics competencies	General digital competencies
GEC1. Convey technical information to different audiences	GMC1. Measuring with precision	GDC1. Use digital technology and media effectively
GEC2. Present information and ideas	GMC2. Estimating, calculating and error spotting	GDC2. Design, create and edit documents and digital media
GEC3. Create texts for different purposes and audiences	GMC3. Working with proportion	GDC3. Communicate and collaborate
GEC4. Summarise information/ideas	GMC4. Using rules and formulae	GDC4. Process and analyse numerical data
GEC5. Synthesise information	GMC5. Processing data	GDC5. Be safe and responsible online
GEC6. Take part in/lead discussions	GMC6. Understanding data and risk	GDC6. Controlling digital functions
	GMC7. Interpreting and representing with mathematical diagrams	
	GMC8. Communicating using mathematics	
	GMC9. Costing a project	
	GMC10. Optimising work processes	

The following table identifies the English, mathematics and digital competencies that we have embedded in the skills throughout this technical qualification. The tutor may also teach competencies that are not listed here, where they naturally occur, but these will not be subject to assessment.

English, mathematics and digital competencies relevant to the digital business services qualification

General competencies	Core skills	PO1:	PO2:	PO3:	PO4:	PO5:	PO6:
English							
GEC1	CS1, CS3, CS5	S1.12, S1.13		S3.1	S4.1, S4.2, S4.3, S4.4		S6.4, S6.5, S6.6
GEC2	CS1, CS5				S4.2		
GEC3	CS1, CS3, CS4, CS5, CS6	S1.12, S1.13			S4.5, S4.6		S6.4, S6.5, S6.6
GEC4	CS4, CS5, CS6		S2.9				S6.1, S6.2, S6.3
GEC5	CS2, CS4		S2.1, S2.3, S2.6, S2.12	S3.2, S3.3		S5.2	S6.4, S6.5
GEC6	CS1, CS5				S4.1		
Mathematics							
GMC1							
GMC2	CS1	S1.2, S1.5, S1.6, S1.9, S1.10	S2.1, S2.8	S3.1, S3.2, S3.3, S3.4, S3.5	S4.3		
GMC3		S1.2, S1.7, S1.13					
GMC4		S1.7, S1.8, S1.10, S1.13	S2.1, S2.2, S2.3, S2.4, S2.5, S2.6, S2.10	S3.1, S3.2	S4.3, S4.4		
GMC5	CS1, CS2, CS3	S1.2, S1.4, S1.8, S1.10	S2.1, S2.2, S2.3, S2.4, S2.5, S2.6, S2.7	S3.1, S3.2, S3.4, S3.5	S4.2, S4.4		

General competencies	Core skills	PO1:	PO2:	PO3:	PO4:	PO5:	PO6:
GMC6	CS4	S1.2, S1.4, S1.5				S5.4, S5.7	
GMC7		S1.5, S1.13		S3.1			
GMC8		S1.5, S1.12, S1.13			S4.3, S4.5, S4.6, S4.7		
GMC9							
GMC10	CS1, CS2, CS3, CS4, CS5, CS6	S1.1, S1.4, S1.5, S1.7, S1.8, S1.10, S1.12, S1.13	S2.1, S2.2, S2.3, S2.5, S2.6, S2.10, S2.11	S3.1, S3.2, S3.4, S3.5	S4.1, S4.3, S4.4, S4.5, S4.6, S4.7		
Digital							
GDC1	CS1, CS2, CS3, CS4, CS5	S1.2	S2.1, S2.2, S2.3, S2.4, S2.5, S2.6, S2.7, S2.8, S2.9, S2.10, S2.11, S2.12, S2.13	S3.4, S3.5	S4.3, S4.4, S4.5	S5.3	S6.1
GDC2	CS2, CS5	S1.7	S2.4, S2.7, S2.9, S2.10, S2.12	S3.1, S3.4, S3.5	S4.3, S4.4, S4.5, S4.6	S5.5	S6.3
GDC3	CS1, CS5	S1.13		S3.2	S4.1, S4.3, S4.5, S4.6, S4.7		S6.4, S6.5
GDC4	CS2, CS3, CS4, CS5, CS6	S1.13	S2.1, S2.2, S2.3, S2.4, S2.5, S2.6, S2.7, S2.8, S2.9, S2.10, S2.11, S2.12, S2.13	S3.1, S3.2, S3.3, S3.4, S3.5	S4.3, S4.4	S5.3, S5.7	
GDC5	CS1, CS2, CS4, CS5	S1.14		S3.1	S4.1, S4.3	S5.7	S6.2

General competencies	Core skills	PO1:	PO2:	PO3:	PO4:	PO5:	PO6:
GDC6		S1.2, S1.6, S1.8	S2.9, S2.10, S2.12	S3.1, S3.4	S4.3, S4.6	S5.1, S5.3	

Section 4: TQ content

Introduction

This section provides details of the structure and content of this qualification.

Qualification structure

The Level 3 Technical Qualification (TQ) in Digital Business Services has 2 components:

- core component, comprising core knowledge and core skills
- occupational specialism components:
 - Performance outcome 1: Source, organise and format data securely in a relevant way for analysis
 - Performance outcome 2: Blend data from multiple sources
 - Performance outcome 3: Analyse structured and unstructured data to support business outcomes
 - Performance outcome 4: Interpret data and communicate a result appropriate to the audience
 - Performance outcome 5: Can apply legal, ethical and professional principles when manipulating data
 - Performance outcome 6: Discover, evaluate and apply reliable sources of knowledge

This combined content indicates the relevant knowledge and understanding of concepts, theories and principles relevant to all occupations within digital business services. The knowledge and skills are all externally assessed through 2 written examinations and an ESP.

The occupational specialisms are divided into performance outcomes, each of which indicates the knowledge and skills required to enable students to achieve threshold competence in the occupational specialism. These performance outcomes are all externally assessed through synoptic assignments, in which the student will be expected to demonstrate required knowledge and skills.

Delivery of content

The content does not have to be taught in a linear fashion. However, providers must pay attention to when the assessments are due to take place to ensure that all of the mandatory content (all elements and performance outcomes) has been taught to students prior to sitting the assessments.

What you need to teach

This section contains all of the mandatory teaching content that underpins the knowledge and skills. The content provided in some cases may not be exhaustive, and providers may wish to teach beyond what is included in the specification in order to support the student's knowledge and understanding.

English, mathematics and digital competencies have been integrated and contextualised within the skills, throughout the qualification content. These competencies are mandatory and subject to assessment. The tutor may also teach competencies that are not listed in this specification, but these will not be subject to assessment.

Route core component

Route core element 1: Business context

What you need to teach

The student must understand:

R1.1 Types of organisations and stakeholders within the business environment.

Organisation types:

- public
- private:
 - small or medium-sized enterprise (SME)
 - large enterprise
 - non-governmental organisation (NGO)
- voluntary/charity:
 - not for profit

stakeholder types:

- internal:
 - end users:
 - owners
 - board of directors
 - employees
 - departments
- external:
 - customers/consumers – purchases goods and services
 - clients – engages professional services
 - direct/indirect competitors
 - outsources services and suppliers
 - shareholders
 - investors

What you need to teach

- funders
- government:
 - local
 - national
 - international

Business environments:

- business to consumer (B2C)
- business to business (B2B)
- business to many (B2M)

R1.2 Key factors that can influence the business environment:

- political factors (for example, cross party focus and agendas)
- economic factors (for example, interest rates, consumer trends, periods of recession, competitors)
- social factors (for example, social mobility, market trends, cultural expectations, socioeconomic aspects)
- technological factors (for example, emerging technologies)
- legal factors (for example, legislation changes and updates)
- environmental factors (for example, carbon footprints, digital waste)

R1.3 The measurable value of digitalisation to a business:

- sales and marketing:
 - enhanced market research
 - increased opportunities for brand promotion
 - increased communication and coverage via social media
 - online opportunities for selling/e-commerce
 - tracking and management of customer/service-user retention
 - digital analytics (for example, customer satisfaction scores)
- operations:
 - enhanced communication channels
 - automation of internal systems
 - remote working functionality
- finance:

What you need to teach

- increased fiscal performance
- increased reporting options and functionality
- reduced operating costs
- key performance indicators (KPIs):
 - easier to monitor

R1.4 The influence and impact of digitalisation within a business context and market environment:

- brand differentiation:
 - brand values
- virtualisation/cloud solutions:
 - enabling scalable, elastic computing solutions to meet business demand
- digital innovations:
 - business intelligence and insight
 - unique selling points (USPs)
- processes and business models:
 - digital manufacturing
 - financial
 - research
- wider access to:
 - customer base
 - range of products and services
- contextualising customer behaviour:
 - digital personalisation
 - platform interoperability
- open standards:
 - using non-platform specific digital identity

R1.5 The role of technical change management in digital operational integrity:

- preparation and planning:
 - innovations within digital technology
 - effectively communicating the rationale for the change
 - communicating the benefits of the change

What you need to teach

- getting 'buy in' from all areas of the business who the change affects
- operations:
 - interaction of new or upgraded tools and processes into current digital ecosystem
 - establishing best practice for use of new or upgraded tools and processes
 - facilitating processes and business models
 - applying fixes

R1.6 The components of technical change management:

- change advisory board (CAB):
 - prioritise change requests
 - review change requests
 - monitor change process
 - provide feedback
- request for change:
 - viability:
 - financial
 - resource
 - analysis of benefits of implementing change request
 - stages of approval
- setting SMARTER objectives:
 - specific
 - measurable
 - achievable
 - realistic
 - time-bound
 - evaluate
 - re-evaluate
- risks:
 - resistance to change from staff/teams
 - misuse of the new tools and processes
 - inadequate support, infrastructure or resource

What you need to teach

- change stalling or impeding workflows
- knowledge management and single sources of dependencies
- impact:
 - forecasting the impact of change implementation on the operational environment
 - measuring positive and negative impact
 - analysis of positive and negative impact
- configuration of digital system impacted by the change:
 - current and proposed
- rollback planning – recovering to a previous stable configuration:
 - back-up methodology
 - local
 - cloud
 - disaster recovery planning
- reproducibility:
 - replicating change across other departments or businesses
 - test environment:
 - servers and software
- traceability:
 - responsibility
 - accountability
 - auditing
- document:
 - maintaining up-to-date information
 - recording of all decisions
 - retaining change documentation
 - user training manuals
 - version control

R1.7 Factors that drive change and a range of methods organisations can apply in response to change.

Internal factors:

What you need to teach

- restructuring
- expansion/growth
- downsizing
- new strategic objectives

External factors:

- political:
 - shift in governmental priorities (for example, Brexit, international trade deals)
 - change in government
 - war
- economic:
 - meeting new funding/revenue streams
 - recession
 - inflation
 - consumer trends
 - competitors:
 - new product/service
 - entering new markets
- social:
 - change in human behaviour (for example, birth rates)
 - market/social trends (for example, rise in online shopping)
 - socioeconomic aspects
 - remote working
 - cultural expectations
- technological:
 - emerging technologies
 - innovation/efficiency
 - artificial intelligence
 - new payment methods
- legal/regulatory:
 - new legislation

What you need to teach

- changes/updates to legislation (for example, national minimum wage, working hours, General Data Protection Regulation (UK GDPR)/Data Protection Act (DPA) 2018)
- removal of European Union (EU) legislation
- environmental:
 - sustainability
 - reduction in carbon footprint
 - green energy
 - digital/tech waste
 - pandemic

Methods to respond to change:

- new or amended:
 - policies (for example, updated health and safety, due to changes in legislation)
 - business processes (for example, implementation of new digital technologies)
 - products or services (for example, innovation for new markets)
- new or improved digital systems for hardware and/or software (for example, DVLA system, NHS referrals, online banking)
- training needs analysis
- restructuring of priorities and resources

R1.8 The steps organisations take to respond to change:

- planning for change:
 - setting budgets and timescales
 - communicating the change activity to all stakeholders
 - clarifying resources required (for example, hardware, software, staffing)
- managing change implementation:
 - monitoring progress during implementation of change
 - maintaining quality of service during change
 - business acceptance and compliance with change
 - team upskilling and development to facilitate the change
 - communicating outcomes of change
 - post-project reviews
- reinforcing change:

What you need to teach

- reinforcement planning:
 - checking change is implemented
 - what steps to take if change is not implemented quickly enough
- collating and analysing outcomes of change data
- monitoring change

R1.9 The measurable value of digital service to customers and end users.

Value to customers:

- efficient digital support for products and services
- timely response to customer queries or needs:
 - communicating expected response time
 - communicating any changes in response and reasons why
- financial savings (for example, product/service price comparisons)
- access and engagement:
 - multi-platform multimodal format (for example, social media, chat, email, phone)
 - time saving
- social integration for user and support community

Value to end users:

- efficient first line, second line and third line digital support to internal staff
- efficient resolution of end user needs
- effective hardware or software deployment

R1.10 The considerations and value of meeting customer and end user needs within a business context.

Considerations to meet customer and end user needs:

- customer or end user profile:
 - cultural awareness/diversity
 - inclusivity
 - accessibility
 - adhering to guidelines, policies and regulatory requirements
 - level of technical knowledge and skills (for example, use of technical terminology)
- customer or end user issues:
 - problem type and pain points:

What you need to teach

- usability
- functionality
- training on new systems
- system or service response time
- system or service availability

Value of meeting customer and end user needs:

- increased financial benefit due to customer retention and satisfaction
- improved user experience
- reputational:
 - protection of brand reputation
 - brand awareness
 - positive media exposure
- quantitative and qualitative market research
- product development through product use analytics
- more sophisticated marketing allowing personalised and targeted advertisements for consumers
- positive third-party reviews (for example, unboxings, meta critic, user reviews)

R1.11 Risks and implications within a business environment.

Risks:

- privacy:
 - potential loss of control over personal and business information
- security:
 - compromises to the confidentiality, integrity and availability of all business data
- non-compliance:
 - non-adherence to policies, procedures and legislation
- audience exclusion:
 - bias towards a particular demographic
 - poor user experience
- insufficient business resilience:
 - inability to adapt to disruptions
 - inability to adapt to change

What you need to teach

- technical:
 - system not fit for business purpose
 - does not meet user requirements

Potential impact of risks:

- lawsuits
- dismissal
- fines
- reputational/brand damage
- withdrawal of licence/rights to practise
- loss of job
- loss of business:
 - reduction in sales

R1.12 The purpose and applications of codes of conduct within a business.

Purpose and application:

- ensures that individuals and organisations operate within policies, procedures and legislation:
 - professional practice
 - industry standard
- describes accepted practice for individuals and organisations:
 - confidentiality
 - ethical principles
 - use of equipment and facilities
 - standard working practice
 - access permissions to data and systems
 - supports individual company values

Types of codes of conduct within a business:

- organisational codes of conduct (for example, Google, X, code of business conduct (COBC))
- professional codes of conduct (for example, British Computer Society (BCS))
- governmental (for example, Technology Code of Practice, Data Ethics Framework)

R1.13 Types of hacker and the implications of hacking and non-compliance with a code of conduct.

Types of hacker:

What you need to teach

- authorised hacker:
 - working on behalf of businesses to test the security of systems or networks using ethical tools, techniques and methodologies
 - has permission to engage in social engineering within agreed parameters
 - feedback given to businesses on system or network vulnerabilities
- semi-authorised hacker:
 - accesses systems or networks without malicious intent
 - discloses vulnerabilities to businesses or relevant authority
- unauthorised hacker:
 - unauthorised access to systems or networks for malicious intent
 - compromises or shuts down security systems or networks
 - unauthorised access to passwords, financial information or other personal data
 - threat actors:
 - hacktivist – motivated by specific cause (for example, animal rights)
 - organised crime syndicate – motivated by financial gain
 - nation state – motivated by political agenda

Implications of hacking and non-compliance:

- internal implications:
 - disciplinary action
 - loss of employment
 - restriction of potential employability
 - restricted privileges
- external implications:
 - loss of status with professional bodies
 - prosecution:
 - fines
 - imprisonment
 - reputational damage

Route core element 2: Culture

What you need to teach

The student must understand:

R2.1 How the increasing reliance on digital technology can cause ethical and moral impacts on business and society.

Impacts on business:

- impact on company culture:
 - changes in face-to-face communication (for example, remote working, video conferencing)
 - increase in expected productivity and outputs
 - increase reach and scale
 - increase of staff monitoring
 - adaptive working practices
- autonomous operation:
 - dehumanisation of service:
 - loss of jobs
 - loss of human empathy in decision making
 - shift in skill requirements and skills redeployment

Impacts on society:

- loss of privacy:
 - digital footprint
 - surveillance
- changing behaviours:
 - social skills
 - scalable remote engagement, wider peer and professional networks
 - creation and curation of a digital identity
- communication access:
 - resistance to technological change
 - potential isolation:
 - transition to remote communication and services
 - due to lack of digital skills or technology
 - locations (for example, limited mobile data coverage)

What you need to teach

- improved access to information (for example, educational, online employment searches, access to 24/7 advice – NHS)

R2.2 The impact of unsafe or inappropriate use of digital technology and mitigation techniques to reduce impact.

Impacts:

- psychological:
 - cyberbullying
 - mental health
 - addiction (for example, gambling, gaming, social media)
 - stress
- physical:
 - posture
 - eye strain
 - repetitive strain injury (RSI)
 - reduction of physical activity
 - disturbed sleep patterns

Mitigation techniques:

- regulate use of digital technology (for example, effects on sleep patterns, effects on mental health, screen breaks)
- report misuse to relevant authority (for example, platform owners, police)
- display screen equipment (DSE) and workstation assessment:
 - equipment (for example, footrest, back support, screen filters)
- self-exclusion (for example, gambling website/app)

Route core element 3: Data**What you need to teach**

The student must understand:

R3.1 The fundamental characteristics of data.

Data types:

- numeric

What you need to teach

- text
- media
- geospatial
- temporal
- logical

Sources of data for organisations:

- internal:
 - sales data
 - marketing data:
 - engagement data
 - financial data
 - employee data
 - customer data
 - usage data:
 - traffic data
- external:
 - public (for example, open data, repositories)
 - government (for example, data.gov.uk)
 - suppliers
 - competitors
 - sector/industry
 - market research
 - repositories

Storing data:

- on premises:
 - internal databases
 - file structures and formats
 - hard drives:
 - solid state drive (SSD)
 - hard disk drive (HDD)

What you need to teach

- portable storage devices
- file servers
- network attached storage (NAS) devices
- storage area network (SAN)
- cloud storage:
 - file storage
 - object storage
 - block storage
 - elastic cloud/scalable storage
 - cloud-based database services

R3.2 The fundamental functions of information systems and the application of data:

- input – data inputted in preparation for processing
- storage – recording and retention of data on an appropriate format:
 - create/store – retain data records for future use or compliance
 - organise – restructure and rank data in a specific order
- processing – transforming data into meaningful output:
 - analyse – business/digital insight through search queries/criteria
 - update – ensuring data records are up to date
 - remove – removal of data entries where appropriate
 - integrate – integrate different sets of information together
- output – data generated by the information system:
 - read/search – identify and find specific information
 - insight – gain from processing to support decisions
- feedback loop – a system structure that allows output to influence future input

R3.3 The concepts and tools of data modelling.

Concepts:

- hierarchical database model – data organised and accessed in hierarchy structure
- network model – data organised and accessed through nodes and links
- entity relationship model – data organised and accessed through use of relationships

Tools and their application:

What you need to teach

- entity relationship diagram (ERD):
 - used to design relational databases
- data flow diagram (DFD):
 - level zero and level one
 - visual representation of information flow within a system

R3.4 The concepts involved in data entry and maintenance.

Data entry:

- assign common data types to screen input boxes:
 - numeric:
 - integer
 - float
 - double
 - text:
 - strings
 - char
 - Boolean:
 - true/false
- reducing risk of data entry errors:
 - validation – check that user-entered data is sensible and in correct format
 - verification – check that user-entered data is accurate
- privacy:
 - compliance with standards and legislation for usage and storage

Data maintenance:

- user:
 - editable data screens for permitted data changes
- system administrator:
 - privileges to allow direct changes to data:
 - user level
 - user group level
 - file level

What you need to teach

Business resource considerations for data entry and maintenance:

- operational:
 - time
 - staffing
- financial:
 - budget
 - estimating and forecasting
- technological:
 - hardware
 - software
 - storage

R3.5 Characteristics of data formats and importance for analysis.

Data formats:

- file-based structure:
 - data held within one file
 - consistent set of attributes, data types and validation
 - context is held within the file
 - data is referenced within the file
 - data stored in flat file format
- directory-based structure:
 - data held across multiple files
 - contains multiple attributes, data types and validation
 - context held within the file and the structure
 - relational data is referenced across multiple files
 - datasets are extracted from system and filtered
 - data can be structured in a hierarchy system
 - allows multiple data owners and sources
- relational database systems:
 - data organised using normalisation to reduce redundancy
 - data connect by relationships

What you need to teach

- structured query language (SQL)/data processing language
- server-client implementation

Importance for analysis:

- easier to query
- easier to keep up to date
- supports with drawing conclusions
- allows sharing of data

R3.6 Methods of presenting and visualising data and their suitability for application.

Presenting data:

- reports
- digital slides
- webinars
- extended reality (XR):
 - virtual reality (VR)
 - augmented reality (AR)
- video
- sound
- animation

Visualising data:

- graphs (for example, bar, line)
- charts (for example, pie, funnel, area)
- data tables
- dashboards
- infographics
- maps
- heat maps

Suitability for application:

- formal or informal
- meeting requirements:
 - brief

What you need to teach

- audience
- level of technical knowledge and skills (for example, use of technical terminology)

R3.7 Applications of data within an organisation:

- analysis:
 - identifying trends and patterns
 - monitoring performance:
 - staff
 - product/service usage
 - forecasting (for example, predictive analytics)
 - informing decision making
- marketing:
 - customer profiles
 - targeting customers
 - direct promotion
- operational management:
 - monitoring and control of operations
 - setting and monitoring of KPIs
 - service improvement

R3.8 Types of data access management across platforms within a digital environment.

Types of data access management:

- user access controls:
 - physical access
 - remote access
 - permissions
 - authentication
- application programming interface (API):
 - set of rules or specifications
 - allows interface between software

What you need to teach**R3.9 Types and application of access control methods:**

- role-based access control (RBAC) – restricts or allows access to resources based on the role of a user
- attribute-based access control (ABAC) – restricts or allows access based on attributes or characteristics
- mandatory access control (MAC) – restricts or allows access based on a hierarchy of security levels
- discretionary access control (DAC) – restricts or allows access based on resource owner preference
- rule-based access control (RuBAC) – restricts or allows access to resources based on rules that are independent to the user's role

Route core element 4: Digital analysis**What you need to teach**

The student must understand:

R4.1 The characteristics and applications of algorithms in digital analysis:

- algorithms – a process or set of clearly defined rules followed to support calculations or problems solving

Characteristics of algorithms:

- finiteness – finite number of steps
- unambiguous – steps must be clear and lead to one meaning
- clearly defined inputs and outputs
- logical sequencing of steps
- iteration – repetition of steps until results achieved
- selection – input leading to choice of step
- structured English

Applications of algorithms for digital analysis:

- automate calculations to improve efficiency of a process
- design a step-by-step solution to solve a problem
- support machine learning for data analysis

What you need to teach**R4.2 The process of computational thinking and tools applied in problem solving and algorithm design.**

Process of computational thinking:

- decomposition – breaking down a complex problem or system into manageable components
- pattern recognition – identification of patterns within problems
- abstraction – analyse information, filter and remove unnecessary detail
- action:
 - sequence – order of processes
 - selection – execution only when conditions met
 - iteration – repetition until conditions met

Tools for problem solving and algorithm design:

- decomposition diagram
- flowchart
- pseudo code

Route core element 5: Digital environments**What you need to teach**

The student must understand:

R5.1 Components of physical computing systems and their applications:

- chassis – to house the components of a system
- optical drive – CD/DVD reader and writer
- mainboard/motherboard – allows internal devices to communicate
- central processing unit (CPU) – main computing part of unit
- random access memory (RAM) – volatile temporary storage
- graphics processing unit (GPU) – enables the ability for output to display unit
- storage (for example, SSD/HDD) – used to store data
- fans – used to maintain the temperature of computing system
- peripherals:
 - screen

What you need to teach

- keyboard
- mouse

R5.2 Types and applications of networks, hardware and software, and the functions of internet of things (IoT).**Networks:**

- personal area network (PAN) – single peer to peer connectivity (for example, wireless headset to a computer)
- local area network (LAN) – interconnected devices belonging to the same organisation within one area (for example, within an office building)
- metropolitan area network (MAN) – 2 or more interconnected LANs within a small geographical area (for example, buildings at opposite ends of town)
- wide area network (WAN) – many interconnected LANs over a large geographical area (for example, the internet)
- virtual private network (VPN) – used to create a secure connection between a device and a network or between different networks (for example, working from home device connecting to corporate network using provided VPN)

Hardware:

- switch – provides connectivity to multiple network devices
- router – used to route traffic between networks
- network interface devices:
 - peripheral component interconnect (PCI) network cards
 - universal serial bus (USB) network cards
- cabling:
 - copper
 - fibre-optic
- wireless access point – used to deliver wireless networking to capable devices
 - servers

Software:

- system software:
 - operating system (OS):
 - proprietary (for example, Microsoft Windows, Apple macOS)
 - open source (for example, Linux, Unix)

What you need to teach

- network operating system (NOS)
- file management utilities
- application software:
 - productivity suites (for example, video editing)
 - protection software (for example, firewall, anti-virus)
 - web browsers (for example, Chrome, Firefox, Edge)

Function of IoT:

- devices dedicated to basic services, data collection, manipulation or analysis, requiring servers to process the task and information:
 - data collection, analysis and manipulation:
 - edge computing
 - sensors (for example, temperature sensors, vibration sensors)
 - network utilisation
 - use within an industrial context
 - use within a smart city context
 - use within a domestic context (for example, home-based)

R5.3 The types and applications of protocols used to create networks and network referencing models.

Protocols:

- web protocols – applied to web communication (for example, retrieving websites):
 - hypertext transfer protocol (HTTP)
 - hypertext transfer protocol secure (HTTPS)
- mail protocols – the ability to send and receive emails:
 - simple mail transfer protocol (SMTP)
 - post office protocol (POP)
 - internet message access protocol (IMAP)
- routing protocols – used to route data between networks:
 - routing information protocol (RIP)
 - open shortest path first (OSPF)

Network referencing models:

- open systems interconnection (OSI):

What you need to teach

- used in troubleshooting – standardised approach to computing system with an underlying structure characterised by 7 layers:
 - physical
 - data
 - network
 - transport
 - session
 - presentation
 - application
- transmission control protocol, internet protocol, user datagram protocol (TCP/IP/UDP):
 - set of communication protocols used by the internet and computer systems characterised by 5 layers:
 - physical
 - data
 - network
 - transport
 - application:
 - file transfer protocol (FTP)
 - secure file transfer protocol (SFTP)
 - dynamic host configuration protocol (DHCP)
 - domain name system (DNS)

R5.4 The components and benefits of virtual computing systems.**Components:**

- virtual machines (VMs):
 - clients (for example, virtual PC, virtual switch, virtual router)
 - servers
- hypervisor:
 - type 1 (for example, Microsoft Hyper-V, VMware ESXi)
 - type 2 (for example, virtual PC, virtual server, VMware Workstation)

Benefits:

- more cost-effective in larger digital environments

What you need to teach

- easier to manage and maintain larger environments
- resilient (for example, clustering)
- environmental (for example, lower carbon footprint)
- disaster recovery options
- efficient testing environments
- education and training platform

R5.5 The types, services and benefits of cloud computing.

Types of cloud:

- private
- public
- community
- hybrid

Cloud services:

- infrastructure as a service (IaaS):
 - applications, OS and data are client managed
 - servers, network infrastructure and storage are vendor managed
- platform as a service (PaaS):
 - applications and data are client managed
 - servers, network infrastructure, storage and OS are vendor managed
- function as a service (FaaS):
 - functions are client managed
 - network infrastructure is vendor managed
- software as a service (SaaS):
 - access to application software
 - no installation or maintenance
 - client only managed user
 - rest is managed by the vendor
- everything as a service (XaaS):
 - outsourcing all organisational digital requirements

Benefits of cloud computing:

What you need to teach

- cloud portability – ability to quickly and easily move services
- cloud sourcing – purchasing services from a third party using the cloud
- elastic cloud – on-demand services which can be scaled to meet needs
- storage – no physical limitations on storage capacity
- cost-effective – efficiencies of scale

R5.6 The methods and benefits of creating a resilient digital environment.

Methods of creating a resilient digital environment:

- installation of software updates/upgrades
- replacement and removal of hardware
- adding redundancy into systems
- decommission and removing legacy hardware and software
- device hardening:
 - removing unneeded applications, ports, permissions and access
 - limiting user account functions
- maintaining effective back-up systems:
 - on premises
 - offsite/remote
 - cloud
- appropriate and reviewed standard operating procedures (SOPs)
- structured staff training for:
 - new hardware/software
 - staff inductions
 - new and updated policies and procedures

Benefits of a resilient digital environment to the organisation:

- increased security:
 - secure transfer of data
 - secure storage of data
 - reduced system vulnerabilities
 - reduced probability of targeted cyber attacks
- increased reputation and profile:

What you need to teach

- customer confidence
- protects brand image
- lower downtime of services

Route core element 6: Diversity and inclusion**What you need to teach**

The student must understand:

R6.1 The principles of digital inclusion, and legislation relating to equality and diversity.

Digital inclusion principles:

- ensuring no one is disadvantaged by a digital system
- checking for bias within datasets before use
- access:
 - technology
 - connectivity
 - conforming to codes of best practice (for example, Web Content Accessibility Guidelines (WCAG))
- technical knowledge and skills

Legislation:

- the Equality Act 2010:
 - direct discrimination
 - indirect discrimination
 - 9 protected characteristics:
 - age
 - disability
 - gender reassignment
 - marriage and civil partnership
 - pregnancy and maternity
 - race
 - religion or belief

What you need to teach

- sex
- sexual orientation
- the Public Sector Bodies (Websites and Mobile Applications) Accessibility Regulations 2018
- the Equality and Human Rights Commission (EHRC) Statutory Code of Practice for 'Services, Public Functions and Associations' under the Equality Act

R6.2 The business benefits of diversity and inclusion:

- more innovative products
- greater appeal to potential employees
- inclusive products
- ability to connect authentically to black, Asian and minority ethnic (BAME) groups
- reduce risk of reputational damage from non-inclusive products

R6.3 Approaches to addressing demographic imbalance in the digital sector:

- increasing cultural awareness of different types of bias
- application of digital inclusion principles
- inclusion by design of digital technologies and systems
- government initiatives
- inclusive recruitment

R6.4 How digital inclusion affects individuals and organisations in the digital sector.

Effects of digital inclusion:

- individuals:
 - inclusive services
 - increased career opportunities
 - enhanced access and connectivity to digital technology
 - greater social mobility
 - greater scope of communication and collaboration
- organisations:
 - greater variation in employment demographics
 - enhanced connectivity in more remote communities
 - creating and expanding commercial markets
 - greater profitability

What you need to teach

- more innovation
- more skilled workforce
- more inclusion resulting in greater employee retention

Adverse effects when principles of digital inclusion are not applied:

- individuals:
 - reduced quality of life
 - social isolation
 - restriction in services
 - financial loss
- organisations:
 - lack of skilled people for required roles
 - lack of innovation
 - breach of legalisation and regulations
 - restriction in services
 - financial loss
 - reputational damage
 - breach of regulations

Route core element 7: Learning**What you need to teach**

The student must understand:

R7.1 The advantages of personal and professional development in the digital sector:

- increased industry and sector competence and knowledge
- increased employability potential and employment security
- achieving accreditation to specific professional disciplines
- maintaining currency and relevance to industry
- achieving access to specific professional bodies
- knowledge of and adherence to industry standards

What you need to teach**R7.2 Areas of emerging or evolving technology and innovative applications within a commercial and domestic context:**

- new mediums for storing information (for example, DNA data storage)
- quantum computing/internet and quantum cryptography
- IoT
- artificial intelligence
- XR:
 - AR
 - VR
 - mixed reality (MR)
- blockchain
- application of 3D printing
- 5G
- drones
- green computing

R7.3 Types of reflection and creativity techniques and how they influence practice within the digital sector.

Reflection techniques:

- Kolb's experiential learning cycle – 4 stages of reflecting on experience:
 - concrete – learning from feelings or experiences
 - reflective – learning from watching
 - abstract – learning from reflections and thinking
 - active – learning from practical application of ideas
- Gibbs' reflective cycle – 6 stages of reflecting on experience:
 - description – recording key components of the task or project (for example, expected outcome, actions taken, data of occurrence)
 - feelings – recording reactions and feelings
 - evaluation – reviewing positive and negative actions and outcomes
 - analysis – reflecting on process and outcomes of task or project
 - conclusion – summarising actions and outcomes from task or project
 - action plan – recording future plans and areas for improvement

What you need to teach

- Boud, Keogh and Walker's model – 3 stages of reflecting on practice:
 - experience – considering behaviour, ideas and feelings
 - reflective – returning to and re-evaluating experiences
 - outcomes – gaining new perspectives or changes in behaviour

Creativity technique:

- design thinking:
 - identify users' needs
 - empathise with users' needs
 - define the problem
 - hypothesise
 - map/challenge assumptions
 - ideate – create ideas that might solve the problem
 - prototype feedback loop
 - conduct qualitative research with users
 - validate/disprove assumptions
 - iterate prototype based on research

R7.4 Sources of knowledge within the digital sector and the factors that need to be considered when assessing the reliability and validity of a source.

Sources of knowledge:

- forums
- textbooks
- academic papers
- white papers
- supplier literature
- search engines
- websites
- blogs
- wikis
- social media
- conferences

What you need to teach

- developer kits
- e-learning
- subject matter expert

Reliability and validity factors:

- author expertise
- bias
- evidence
- subjectivity
- context
- intended audience
- date of publication
- corroboration of sources
- citations

Route core element 8: Legislation**What you need to teach**

The student must understand:

R8.1 Legislation and regulation requirements applied across sectors in a digital context.

UK requirements:

- Health and Safety at Work etc Act 1974 (including The Health and Safety (Miscellaneous Amendments) Regulations 2002, Work at Height Regulations 2005, Manual Handling Operations Regulations 1992, Management of Health and Safety at Work Regulations 1999, Health and Safety (Display Screen Equipment) Regulations 1992):
 - key features:
 - adequate training of staff
 - adequate welfare provision for staff at work
 - a safe working environment that is properly maintained
 - suitable provision of relevant information, instruction and supervision
- Investigatory Powers Act 2016:
 - key features:

What you need to teach

- enhances powers for law enforcement and security agencies to obtain and intercept communications and data
- highlights the way in which new powers are authorised and overseen
- ensures powers are fit for the digital age
- Freedom of Information Act 2000:
 - key features:
 - public sector is required to publish information
 - members of the public are entitled to request information from public authorities
- Computer Misuse Act 1990:
 - key features:
 - governs unauthorised access to computer programmes or data
 - governs unauthorised access with further criminal intent
 - governs unauthorised modification of computer material
- Digital Economy Act 2017:
 - key features:
 - regulation of communication infrastructure and services
- Public Sector Bodies (Websites and Mobile Applications) (No.2) Accessibility Regulations 2018:
 - key features:
 - to make clear the level of accessibility required across websites or applications
- Copyright, Designs and Patents Act 1988:
 - key features:
 - protects intellectual property rights
 - enables control over the ways in which material can be used
- Waste Electrical and Electronic Equipment Regulations 2013:
 - key features:
 - governs the safe and environmentally responsible disposal of electrical equipment
- Human Rights Act 1998:
 - key features:
 - governs an individual's right to privacy
 - governs surveillance

What you need to teach

- Data Protection Act 2018:

- key features:
 - implementation of UK GDPR

International requirements:

- European Convention on Human Rights (ECHR) – Article 8:

- key features:
 - the right to respect for family and private life

- UK GDPR (General Data Protection Regulation):

- key features:
 - lawfulness, fairness and transparency
 - purpose limitation
 - data minimisation
 - accuracy
 - storage limitation
 - integrity and confidentiality (security)
 - accountability
 - data security

- Electronic Communications Privacy Act (ECPA) 1986 – USA:

- key features:
 - protect wire, oral and electronic communications while in transit

- Controlling the Assault of Non-Solicited Pornography And Marketing (CAN-SPAM) Act 2003 – USA:

- key features:
 - sets rules for commercial emails and gives rights to recipients (for example, to unsubscribe)

R8.2 The role of criminal law, industry standards and professional codes of conduct in a digital context.

Criminal law:

- national:
 - maintains order
 - resolves disputes
 - protects individuals and property

What you need to teach

- safeguards civil liberty
- international:
 - governs offences committed outside of the UK

Industry standards and professional codes of conduct:

- compliance
- facilitating competition within industry
- promoting innovation
- providing interoperability between new and existing systems
- ensuring security
- ensuring transparency of sectors

R8.3 Where to access industry standards and professional codes of conduct in a digital context.

Industry standards:

- International Organization for Standardization (ISO)
- Internet Engineering Task Force (IETF):
 - Request for Comments (RFC)
- Electronic Industries Alliance/Telecommunications Industry Association (EIA/TIA)
- British Standard (BS)
- Institute of Electrical and Electronics Engineers (IEEE)
- Payment Card Industry Security Standards Council (PCI SSC)

Professional codes of conduct:

- British Computer Society (BCS)
- Institution of Analysts and Programmers (IAP)
- Chartered Institute of Information Security (CIISec)

R8.4 The importance of keeping up to date with UK and international legislation and regulations and potential consequences to businesses across sectors of being non-compliant.

Importance:

- protection for business
- protection for customer
- avoiding consequences of non-compliance

Potential consequences of non-compliance:

What you need to teach

- financial:
 - fines
 - loss of business/income
- legal:
 - prosecution
- professional:
 - termination of employment
 - revoked responsibilities
- reputational:
 - brand damage
 - customer perception
- sector specific consequences (for example, health, education, retail, hospitality)

Route core element 9: Planning**What you need to teach**

The student must understand:

R9.1 The principles of project planning.

Identification of project aims and objectives:

- project scope:
 - user/client requirements
 - business case
- expected outcomes
- stakeholder map
- timeline and deadlines
- linked to organisational strategic objectives

Resource requirements:

- people and skills
- estimates and costings
- venues/premises

What you need to teach

- facilities
- equipment
- hardware and software
- stakeholder engagement

Budgeting:

- accurate estimating and forecasting
- financial contingency planning
- reasonable and documented assumptions

Cost-benefit analysis:

- viability of project
- quantifying the intended deliverables

Project lifecycle:

- timing and scheduling (for example, communication plan, reporting schedules)
- work packages to break down deliverables
- milestones
- prioritisation identification
- dependencies identification

Risk and issues management:

- identification
- probability
- impact
- prioritisation
- analysis
- mitigation controls
- contingency planning

Quality management:

- monitoring of project deliverables
- quality assurance
- quality control
- review and audit

What you need to teach**R9.2 The consequences of ineffective project planning:**

- under-resourced
- escalating costs
- exceeding timeframes
- unable to deliver outcomes
- negative environmental impact
- health and safety risks
- scope creep

R9.3 The application of project planning techniques in a business context.

Techniques:

- programme evaluation review technique (PERT) – used to identify and estimate timescales of project activities
- critical path analysis (CPA) – used to identify key tasks within a project
- work breakdown structure (WBS) – used to break down the scope of project into manageable work packages
- responsible, accountable, consulted and informed (RACI) matrix – used to manage and categorise stakeholders
- must have, should have, could have, won't have (MoSCoW) – used to prioritise the requirements of a project

Route core element 10: Security**What you need to teach**

The student must understand:

R10.1 Types of confidential company, customer and colleague information:

- human resources:
 - salaries
 - benefits/perks
 - employment data:
 - recruitment
 - termination

What you need to teach

- appraisals/disciplinary
- medical information
- commercially sensitive information:
 - sales revenue
 - trade secrets
 - profit margins
 - client/customer details
 - stakeholder details
 - contracts
 - intellectual property (IP)
- access information:
 - passwords
 - multi-factor authentication
 - email accounts
 - phone numbers
 - access codes
 - passkeys

R10.2 The importance of maintaining and the consequences of not maintaining confidentiality, integrity and availability (CIA).

The importance of maintaining CIA:

- maintains compliance
- maintains trust with internal and external stakeholders
- promotes positive brand image
- avoids security risks and unauthorised access

The consequences of not maintaining CIA:

- financial:
 - regulatory fines
 - refunds/compensation to customers
 - loss of earnings
- legal:

What you need to teach

- lawsuits
- termination of contract
- reputational:
 - loss of clients
 - damage to brand

R10.3 The technical and non-technical threats that may cause damage to an organisation:

- technical:
 - botnets
 - denial-of-service (DoS)
 - distributed denial-of-service (DDoS)
 - hacking:
 - cross-site scripting (XSS)
 - password-cracking software
 - SQL injection
 - malware:
 - viruses
 - trojans
 - worms
 - remote access trojans (RATs)
 - key loggers
 - ransomware
 - spyware
 - adware
 - malicious spam:
 - phishing
 - spear phishing
 - smishing
 - vishing
 - pharming
 - buffer overflow

What you need to teach

- non-technical:
 - human error
 - malicious employees
 - disguised criminals
 - natural disaster (for example, flooding)
 - social engineering

R10.4 The technical and non-technical vulnerabilities that exist within an organisation:

- technical:
 - inadequate encryption (for example, weak or outdated)
 - out-of-date:
 - software
 - hardware
 - firmware
- software no longer supported by supplier:
 - compatibility of legacy systems
 - fail-open electronic locks
 - weak passwords (for example, default passwords)
 - missing authentication and authorisation
 - exploitable bugs/zero-day bugs
- non-technical:
 - employees:
 - not following policies and procedures
 - competency levels of staff
 - lack of recruitment screening
 - poor data/cyber hygiene (for example, not archiving dormant staff accounts and access)
 - physical access controls:
 - inadequate security procedures:
 - door access codes not changed regularly
 - using simple access codes and reusing access codes (for example, 1234)
 - no monitoring of access to secure areas

What you need to teach

- unnecessary staff access to secure areas

R10.5 The potential impacts of threats and vulnerabilities on an organisation:

- loss of sensitive information
- unauthorised access to the system or service
- overload of the system to affect a service
- corruption of a system or data
- damage to system operations
- disclosure of private information and credentials
- unauthorised access to restricted physical environment
- essential security updates not installed

R10.6 Risk mitigation controls to prevent threats to digital systems:

- National Cyber Security Centre (NCSC) Cyber Essentials:
 - firewall to secure internet connections
 - choose most secure settings for devices and software
 - control access to data and services
 - protection from viruses and malware
 - up-to-date software and devices
- anti-virus and anti-malware software
- firewalls:
 - software
 - hardware
- intrusion detection and prevention systems
- encryption:
 - purpose
 - process
 - protocols
- user access, policies and procedures:
 - permissions
 - IT user policies
- staff training and continuing professional development (CPD):

What you need to teach

- human firewall
- back-ups:
 - full
 - incremental
 - differential
- software and system maintenance:
 - importance of latest software updates
 - scheduled maintenance
 - interruption to service
- air gaps
- honeypot
- virtual private networks (VPNs)

R10.7 The process and protocols of internet security assurance.

Processes:

- installation and configuration of firewalls:
 - inbound and outbound rules:
 - traffic type rules
 - application rules
 - destination and source rules
- network segregation:
 - VLANs
 - physical network separation
 - offline networks
- network monitoring
- removable media controls
- anti-virus
- managing user privileges
- penetration/vulnerability testing:
 - port scanning
 - SQL injecting testing

What you need to teach

- Secure Sockets Layer (SSL)/Transport Layer Security (TLS) scanning

Protocols:

- VPN:
 - IPsec VPN
 - SSL VPN
- SSL/TLS
- Secure File Transfer Protocol (SFTP)
- Secure Shell (SSH) – secure connection to devices
- HTTPS

R10.8 The interrelationship of components required for an effective computer security system.

Components:

- confidentiality, integrity and availability (CIA)
- identification, authentication, authorisation and accountability (IAAA)
- risk management:
 - threats
 - vulnerabilities
 - impact
 - probability
 - mitigation

Route core element 11: Testing**What you need to teach**

The student must understand:

R11.1 The purpose of testing digital components.

Purposes of testing:

- functionality
- usability
- compatibility
- accessibility

What you need to teach

- customer/client/end user satisfaction
- fault-finding and de-bugging
- impact assessment
- efficiency of individual components
- review accuracy of data
- ensuring desired outcome (for example, service or product)
- performance monitoring

Digital components:

- software
- hardware
- data
- interfaces
- test scripts

R11.2 The process of applying root cause analysis to problems:

- define the problem
- collect data relating to the problem
- identify what caused the problem
- prioritise the causes
- identify solutions to the underlying problem
- implement the change
- monitor and sustain

R11.3 Testing methods and their application in the digital sector:

- concept testing:
 - scoping and validating requirements
 - informing decisions before committing time and resources to a project
- usability/audience testing:
 - testing whether the functionality fulfils the desired outcome
 - identifying usability problems
 - determining user satisfaction with product
- stress testing:

What you need to teach

- testing whether a system can function with expected demand by replicating real world load
- penetration testing:
 - determining vulnerabilities in a controlled environment
 - authorised attack on systems
- unknown environments testing:
 - testing inputs and outputs against expected results
 - measuring the functional requirements of a system
- known environments testing:
 - testing internal structure of process flows

Route core element 12: Tools**What you need to teach**

The student must understand:

R12.1 The application of digital tools and methods in a business context.

Presentation tools:

- slide/page presentation software:
 - product demo
 - sales meetings
 - training
 - promotion and marketing (for example, expos, speaking at events)
- digital infographics:
 - posters
 - leaflets
- graphs:
 - sales trends
 - market comparisons
- dashboards:
 - display/monitor KPIs
 - management information

What you need to teach

- business intelligence

Project management methodologies:

- agile – promotes adaptability through different iterations:
 - frameworks:
 - Scrum
 - Kanban
 - Lean
- waterfall – definitive stages that follow on from each other
- spiral
- rapid application development (RAD)

Project management tools and their application:

- Gantt charts – used to measure time scales and milestones of a project
- flowcharts – outline the logical process for workflow
- stakeholder power interest matrix – visual representation to assess stakeholder priority
- budget sheets – organise and document finances over project lifespan (for example, forecasting, expense tracking)

Evaluation tools:

- marketing analytics tools:
 - search analytics
 - social media analytics
- financial analytics tools
- reporting tools
- data mining

R12.2 The application of collaborative communication tools and technologies in business.

Communication tools and technologies:

- intranet
- shared workspaces:
 - online
 - on premise
- shared documents

What you need to teach

- discussion threads
- online shared storage
- mark-up:
 - track changes
 - comments
- video conferencing

Route core skills

The employer set project (ESP) requires that students apply and contextualise core knowledge through the demonstration of the following core skills. Parameters have been provided for each skill in order to define what students must be able to demonstrate to fully satisfy the requirements of the ESP.

CS1. Working with stakeholders to clarify and consider options to meet requirements

Route core underpinning knowledge:

- Route element 1 – Business context
- Route element 2 – Culture
- Route element 8 – Legislation
- Route element 9 – Planning
- Route element 12 – Tools

The student must be able to:

- identify scope of processes and expected outcomes:
 - collect data to clarify appropriate details
 - estimate budget and timescales
 - assess and calculate potential risk to meet requirements
 - assess cultural impacts to meet requirements
- analyse options to meet stakeholder requirements
- discuss with stakeholders to agree parameters based on analysis of options:
 - ask and respond to questions to clarify understanding
 - explain and present information using technical language correctly and coherently
 - encourage contributions from all stakeholders
 - summarise key points of discussion
- identify roles of stakeholders:
 - responsibilities
 - accountabilities
 - consulted

The student must be able to:

- informed
- systematically organise and accurately record decisions and changes
- gather, process and store all information and data responsibly, in compliance with appropriate regulations and standards

(GEC1, GEC2, GEC3, GEC6, GMC2, GMC5, GMC10, GDC1, GDC3, GDC5)

CS2. Research and investigate relevant sources and data to meet requirements**Route core underpinning knowledge:**

- Route element 3 – Data
- Route element 7 – Learning
- Route element 8 – Legislation
- Route element 11 – Testing

The student must be able to:

- review and analyse requirements
- identify and gather relevant sources:
 - apply factors of validity and reliability
 - comply with appropriate regulations and standards when gathering sources
 - identify potential bias in sources
- develop search criteria to synthesise queries to support research and investigation
- apply search queries to identify and gather data from sources
- analyse and interrogate data to draw conclusions from the investigation
- identify and apply appropriate testing methods to verify and validate conclusions
- record final conclusions and outcomes of testing

(GEC5, GMC5, GMC10, GDC1, GDC2, GDC4, GDC5)

CS3. Apply a valid approach to solving data problems, identifying and resolving issues whilst recording progress and solutions to meet requirements

Route core underpinning knowledge:

- Route element 1 – Business context
- Route element 3 – Data
- Route element 4 – Digital analysis
- Route element 5 – Digital environments
- Route element 7 – Learning
- Route element 9 – Planning
- Route element 11 – Testing

The student must be able to:

- identify and investigate the scope of the problem
- decompose problem into components parts:
 - identify and analyse individual issues
- prioritise identified issues
- identify possible solutions and fixes
- plan, implement and test possible solutions and fixes
- apply appropriate solutions and fixes based on tested outcomes
- accurately record progress and outcomes:
 - use technical language correctly to aid understanding of outcome
 - organise outcomes logically and coherently
- record and store data in compliance with relevant legislations and guidelines:
 - include the appropriate level of detail to meet requirements

(GEC1, GEC3, GMC5, GMC10, GDC1, GDC4)

CS4. Ensure that actions identify and mitigate risk to security

Route core underpinning knowledge:

- Route element 1 – Business context
- Route element 8 – Legislation
- Route element 9 – Planning
- Route element 10 – Security

The student must be able to:

- identify and record potential risks:
 - threats
 - vulnerabilities
- assess probability and impact of risk
- calculate the severity and interpret the priority of risk based on the probability and impact
- identify and apply appropriate risk mitigation controls and components
- record outcomes:
 - include the appropriate level of detail to meet requirements
- comply with relevant legislation and guidelines

(GEC3, GEC4, GEC5, GMC6, GMC10, GDC1, GDC4, GDC5)

CS5. Communicate information clearly to technical and non-technical stakeholders

Route core underpinning knowledge:

- Route element 1 – Business context
- Route element 3 – Data
- Route element 6 – Diversity and inclusion
- Route element 9 – Planning
- Route element 12 – Tools

The student must be able to:

- identify stakeholder requirements:
 - technical or non-technical terminology
 - formal or informal
 - digital level of knowledge
- identify scope of communication to meet stakeholder requirements:
 - required format
 - compliance with guidelines
 - frequency of communications
 - content and context:
 - design and layout
 - level of detail
 - digital inclusion
- apply the identified requirements for the communications
- select and apply appropriate tools to communicate with stakeholders:
 - presentation tools
 - project management tools
 - collaborative communication tools
- record and document appropriate communications information:
 - summarise key points of communication
 - process and store data in compliance with relevant legislation and guidelines

(GEC1, GEC2, GEC3, GEC4, GEC6, GMC10, GDC1, GDC2, GDC3, GDC4, GDC5)

CS6. Reflect and evaluate their own performance and understand the need for continuous learning and development**Route core underpinning knowledge:**

- Route element 2 – Culture
- Route element 7 – Learning
- Route element 12 – Tools

The student must be able to:

- identify parameters of reflective evaluation:
 - frequency of evaluation
 - purpose of evaluation
 - required data to support evaluation
- apply reflective evaluation techniques based on a review of key factors and data:
 - own performance
 - processes undertaken
 - expected outcomes versus actual outcomes
- draw and summarise conclusions clearly and concisely, to support further analysis
- analyse conclusions to identify areas for continuous learning and improvement:
 - learn from experience (LFE)
- record and document appropriate continuous learning and improvement information

(GEC3, GEC4, GMC10, GDC4)

Occupational specialism: Data Technician

The numbering is sequential throughout the performance outcome, from the first knowledge statement, following on through the skills statements. The 'K' and 'S' indicate whether the statement belongs to knowledge or skills.

Mandatory content:

- Performance outcome 1: Source, organise and format data securely in a relevant way for analysis
- Performance outcome 2: Blend data from multiple sources
- Performance outcome 3: Analyse structured and unstructured data to support business outcomes
- Performance outcome 4: Interpret data and communicate a result appropriate to the audience
- Performance outcome 5: Can apply legal, ethical and professional principles when manipulating data
- Performance outcome 6: Discover, evaluate and apply reliable sources of knowledge

Performance outcome 1: Source, organise and format data securely in a relevant way for analysis

Knowledge - What you need to teach

The student must understand:

K1.1 Sources of data and how to access and process the appropriate sources for the relevant task.

Sources of data:

- internal:
 - organisational data
 - departmental data
- external – held by external organisations:
 - public
 - private
 - voluntary/charity:
 - not for profit
 - non-governmental organisations (NGOs)

Data within internal and external sources:

- open – free to access, available to anyone to re-use and redistribute:
 - published by independent organisations
 - published as a government requirement
- private:

Knowledge - What you need to teach

- person identifiable
- commercially sensitive data
- licensed data:
 - ordnance survey and mapping
 - address data

Accessing and processing data:

- compliance – with security standards and legislation (for example, UK GDPR/DPA 2018)
- select – identify data
- prepare – checking data quality
- extract – process of retrieving data
- transform – performing an operation or calculation

K1.2 Types, features and functions of information systems and their application.

Features and functions of information systems:

- storage
- manipulation
- retrieval methods to access and export

Type of information system	Applied features	Applied functions
Online purchasing	Public facing, presentation of product and prices	Recording transactions (for example, shopping basket, calculating pricing, recommended purchases)
Booking/scheduling	Allocated time/date slots, management of availability	Managing resources and availability (for example, payment systems, online calendars, email confirmation)
Inventory management	Log and order of commodity levels, option to automate ordering	Stock management (for example, current stock levels, email notifications)

Knowledge - What you need to teach

customer relationship management (CRM) system	Lead/customer and sales management	Managing customer/client lists and interactions
Social media	Public facing, used in a wide variety of organisations	Managing user-generated content

K1.3 How different types of organisations within sectors work with information systems and data.

Sectors	Types of application within organisations
Education: <ul style="list-style-type: none"> • school • college • university 	<ul style="list-style-type: none"> • booking/scheduling – courses, student and staff timetable, resources • inventory – product replenishment • reporting – academic and demographic information
Health: <ul style="list-style-type: none"> • GP surgery • hospital • dentist 	<ul style="list-style-type: none"> • booking/scheduling – appointments, patients, resources • inventory – medical consumables • electronic health record (EHR) and associated standards
Hospitality: <ul style="list-style-type: none"> • hotel • restaurant • theatre 	<ul style="list-style-type: none"> • booking/scheduling – reservations • CRM system – marketing, loyalty/rewards • social media – promotion, feedback
Retail: <ul style="list-style-type: none"> • high street • online 	<ul style="list-style-type: none"> • online retail – purchasing, predicted recommendations • inventory – product replenishment • CRM – marketing, loyalty/rewards • social media – promotion, feedback

Knowledge - What you need to teach

Technological:

- software
- infrastructure
- digital support
- cyber security
- SaaS
- user experience/interface (UX/UI)
- digital transformation

K1.4 Types of data structures, their characteristics and applications.

Types:

- structured:
 - characteristics:
 - organised
 - consistent
 - fixed data field names
 - fixed data type and/or length
 - applications:
 - spreadsheets
 - databases (for example, relational database, data warehouses)
- unstructured:
 - characteristics:
 - no predefined data model
 - not organised in a predefined manner
 - applications:
 - databases (for example, NoSQL database)
 - social media content
 - web pages/sites
 - documents
 - audio/visual
- semi-structured:
 - characteristic:
 - flexible data model

Knowledge - What you need to teach

- applications:
 - spreadsheets
 - datalog file

K1.5 Data types and the importance for calculations and blending of data.

Data types:

- numeric:
 - integer – whole number
 - decimal:
 - float
 - double
 - financial:
 - currency
- temporal:
 - date
 - time
 - duration
- text:
 - single and multiple characters
 - words
 - paragraphs
- geospatial:
 - location
- media:
 - image
 - audio
 - video
- logical:
 - Boolean
- references:
 - pointer to another data location

Knowledge - What you need to teach

Size of the dataset (for example, big data):

- volume
- veracity
- velocity
- value
- variety

Importance and requirements of data types for calculations and blending of data:

- standardised data:
 - consistent data types
- appropriate data:
 - correct data type for required data
- compatible with each other to allow effective calculations and blending

K1.6 Methods of transferring data from one computer storage system to another:

- export/import (for example, comma-separated values (CSV), JavaScript Object Notation (JSON), spreadsheet file, text file)
- API:
 - representational state transfer (REST) – RESTful and RESTless
 - open data protocol (OData)

K1.7 The differences between primary and secondary data usage and usage by organisations and individuals.

Differences	Primary	Secondary
Purpose	Used for its original purpose	Used for a further purpose
Data	Current data	Past data
Sources	Surveys, observations, questionnaires, interviews	Forums, government publications, internal records
Relevance	Specific for requirements	Useful but not created for this purpose/requirement

Knowledge - What you need to teach

Legitimacy	Obtain permission to use, informed consent of intended use	Permissions may be required depending on use
Availability	Design collection needed – time consuming, labour intensive	Readily available, accessible

Organisational data usage:

- customer centricity (for example, customer service and satisfaction, promoting customer-centred approach)
- business intelligence and forecasting (for example, prediction of future risks and opportunities, informed business decision making)
- product design (for example, research and development processes, new/updated/terminated product lines)
- financial (for example, cashflow, funding, department contribution)
- staff management and development (for example, KPIs, staff profiles, skill gaps)
- sector specific classification:
 - healthcare (for example, inventory, birth and death rates)
 - education (for example, retention, achievement, attendance)
 - government (for example, tax, employment rate, census)

Individual data usage:

- financial (for example, banking, tax, income, budgeting)
- consumer behaviour (for example, frequent purchasing, loyalty schemes)
- health and fitness (for example, weight, calories, heart rate)
- entertainment (for example, suggested viewing/listening)

K1.8 The stages of data lifecycle management and their use of data:

- preparation:
 - design – selection of appropriate dataset type and data model based on requirements
 - migration – reliable transfer of data from one database or source to another
 - creation/acquisition of data (for example, created or supplied by third party):
 - consent for usage
- operations:
 - application and governance of:

Knowledge - What you need to teach

- access control – granting or removing access to data where appropriate
- security/privacy – ensuring data is safe and secure
- version control – maintaining and recording version of dataset
- retention policy – maintaining compliance with legal and business guidelines
- storage
- usage/exploitation
- maintenance
- share
- back-up
- restoration
- post-operations:
 - retention – archiving of dataset for future use
 - destruction/disposal – secure and appropriate destruction of data and data storage

K1.9 Types of data quality issues, the importance of addressing data quality issues and the process of cleansing:

- data quality issues:
 - missing:
 - missing completely at random (MCAR)
 - missing at random (MAR)
 - missing not at random (MNAR)
 - systematic
 - outliers (for example, abnormal value)
 - abnormal trends and patterns
 - duplications
 - different formats
 - inconsistency
 - mismatched types
 - structural (for example, file types, file conversion)
 - unstandardised (for example, yes/no versus Y/N, date formats)
- importance of addressing data quality issues:

Knowledge - What you need to teach

- enables accurate and meaningful results from analysis
- avoidance of bias within data management
- data confidence through the process of cleansing:
 - remove (for example, duplicates, out-of-date data, outliers)
 - edit errors (for example, typos)
 - parsing – reading text data into a structured format

K1.10 Factors of data quality and confidence, and methods of verifying and validating data.

Data quality and confidence:

- storage
- classification of data:
 - content – classified based on contained information
 - context – metadata and application domain
 - user – classified based on user knowledge and specification
- understanding the link between classification of data and appropriate use and ease of future analysis
- data dictionary
- normalisation where appropriate – relational databases:
 - unnormalised form (UNF)
 - 1st normal form (1NF)
 - 2nd normal form (2NF)
 - 3rd normal form (3NF)

Auditing data – to confirm the data is clean, correct and useful:

- verification methods:
 - cross-checking
 - review external systems for consistency against original data
 - quality assurance
 - spell check
- validation types:
 - check digit
 - format check
 - length check

Knowledge - What you need to teach

- lookup table
- presence check
- range check

K1.11 Selection criteria and types of tools and techniques for identifying data trends and patterns:

- selection criteria for the appropriate tools and techniques:
 - purpose for identifying trends and patterns
 - expected and relevant outcomes:
 - gains
 - trends
 - regressions
 - derived data
 - availability of resources
- tools for identifying trends and patterns:
 - programming languages (for example, Python, R, Scala)
 - dashboards (for example, KPIs, financial)
 - query tool (for example, SQL)
 - scatter graphs/trends
 - histograms and box plots
- techniques for identifying trends and patterns:
 - exploratory data analysis
 - time series forecasting
 - hypothesis testing
 - data mining

K1.12 Purpose, principles and functions of data architecture.

Purpose:

- a framework guiding the development and operation of information systems and data storage
- a set of rules and policies that are able to define and explain the type of data

Principles:

- access – data available for user functions
- definition – data is valued as an asset

Knowledge - What you need to teach

- managed – data is in a form which facilitates maintenance and understanding of the data pipeline process
- secured – data has the appropriate security controls applied and is only accessed by appropriate users
- shared – data can be extracted and shared between communities, without compromising safety or exporting sensitive information

Functions:

- organise data – grouped by selected criteria:
 - data types
 - formats (for example, database, spreadsheets, CSV file)
- data storage – specifying the different types of data storage and its location:
 - on premises
 - cloud
 - third-party
 - hybrid
- permissions and access across different systems (for example, file server):
 - levels of permissions
 - levels of access
 - multi-factor authentication

Skills - What you need to teach

The student must be able to:

S1.1 Identify a variety of different sources of data to support analysis to meet a specific business requirement:

- assess the parameters of the analysis requirements
- select the appropriate sources of data from:
 - internal sources
 - external sources
- identify the appropriate data types required for analysis (for example, numeric, text, media, temporal)

(GMC10)

Skills - What you need to teach**S1.2 Access, process and transfer data from one computer storage system to another:**

- select appropriate sources of data
- extract relevant data
- standardise and prepare data (for example, quality, format, remove redundant data)
- ensure storage systems have appropriate proportion of storage space
- export data effectively from initial computer storage system
- transform data to meet importing requirements
- import data effectively into alternate computer storage system
- comply with all appropriate security standards and legislation

(GMC2, GMC3, GMC5, GMC6, GDC1, GDC6)

S1.3 Collect data from different internal and external sources:

- gather appropriate information from internal and external sources
- identify and select appropriate data structures within sources to meet requirements:
 - structured (for example, spreadsheets, database)
 - unstructured (for example, social media, web)
 - semi-structured (for example, datalog file)
- collect and process data in compliance with appropriate legislation

S1.4 Classify data for sector specific applications:

- identify and interpret data to support the classification process
- classify data based on required criteria:
 - content
 - context
 - user
- organise and group datasets logically and coherently into relevant sectors based on criteria:
 - health
 - retail
 - hospitality
 - technological
 - education

(GMC5, GMC6, GMC10)

Skills - What you need to teach**S1.5 Apply appropriate tools and techniques to identify trends and patterns in data:**

- identify and analyse the parameters of the task:
 - specific trends and patterns required
- select appropriate techniques and tools to identify the trends and patterns
- apply the techniques and tools appropriately to support analysis:
 - apply the most appropriate representation of the information (for example, dashboard, graph)
 - appropriate level of detail and accuracy
- review and critically interpret findings of trends and patterns to meet task

(GMC2, GMC6, GMC7, GMC8, GMC10)

S1.6 Organise and store sourced data securely for a specific business requirement:

- select appropriate types of data storage and location (for example, on premises, cloud, third-party)
- select appropriate data storage format (for example, database)
- organise sourced data based on selected criteria
- store sourced data securely complying with all appropriate security standards and legislation:
 - apply appropriate levels of permissions and access
- review operations to make sure requirements have been met

(GMC2, GDC6)

S1.7 Blend data from different sources into a single unified structure for a specific business requirement:

- identify and analyse each source in preparation for blending
- prepare and refine each source for effective blending:
 - check consistency of data types
 - check compatibility of data formats
- review and standardise data
- blend sources to create a single unified structure
- test outcome meets requirements

(GMC3, GMC4, GMC10, GDC2)

S1.8 Change and format different data types to support efficient analysis for a specific business requirement:

- identify requirements of analysis
- identify data types (for example, numeric, financial, temporal, text)

Skills - What you need to teach

- change data type to be consistent to support the analysis
- format and manipulate data types to support efficient analysis
- perform the analysis to meet identified requirements
- review output meets requirements

(GMC4, GMC5, GMC10, GDC6)

S1.9 Analyse and identify data quality issues:

- analyse data for possible issues
- identify quality issues (for example, missing data, inaccurate data)
- record the location and type of quality issues within the data

(GMC2)

S1.10 Perform data cleansing to meet a specific business requirement:

- identify the parameters of the cleansing task
- assess data to be cleansed
- apply the process of data cleansing to meet the business requirement:
 - remove (for example, duplicates)
 - edit (for example, out-of-date data)
 - parse (for example, making data easier to read)
- review the output of the cleansing process against the business requirement

(GMC2, GMC4, GMC5, GMC10)

S1.11 Apply verification methods to validate data and save resultant dataset:

- identify appropriate methods to validate (for example, format check)
- apply the verification method to data
- assess reliability and validity of sources based on verification (for example, citing trusted sources)
- save resultant dataset securely

S1.12 Rationalise the appropriateness of the resultant dataset for a specified analysis:

- identify the requirements of the specified analysis
- compare analysis requirements with dataset
- rationalise how the dataset is appropriate for the analysis
- present and organise information logically and coherently to allow for future analysis and conclusions:
 - include appropriate level of detail to reflect audience and purpose

Skills - What you need to teach

- express ideas clearly and concisely

(GEC1, GEC3, GMC8, GMC10)

S1.13 Provide a statistical summary of analysis:

- identify the requirements of the summary
- apply relevant tools and techniques to identify trends and patterns
- identify relevant outcomes and results:
 - regressions
 - trends
 - gains
 - derived data
- analyse and interpret outcomes in statistical summary
- present and communicate summary that meets intended purpose and audience:
 - use technical language correctly to support understanding of summary
 - include appropriate level of detail to reflect audience and purpose

(GEC1, GEC3, GMC3, GMC4, GMC7, GMC8, GMC10, GDC3, GDC4, GDC5)

S1.14 Summarise and explain how data security standards and legislation have been followed in handling data (for example, UK GDPR/DPA 2018):

- summarise the key points of handling data and its compliance with relevant standards and legislation
- explain responsible and safe usage of data online and offline following standards and legislation
- use appropriate technical terms (for example, information from the DPA 2018)

Performance outcome 2: Blend data from multiple sources**Knowledge - What you need to teach**

The student must understand:

K2.1 Types of data technologies and systems that support data operations:

- database:
 - relational – stores and provides access to data points that are related to one another
 - non-relational – model and structure optimised specifically for the type of data being stored

Knowledge - What you need to teach

- data warehousing – centralises and consolidates large amounts of data to support business intelligence:
 - data marts – a simple data warehouse focussed on a single functional area
- spreadsheets – storage of data in rows and columns usually utilising application software

K2.2 The fundamentals of data operations:

- database operations:
 - joining tables
 - primary keys
 - foreign keys
 - import and export
 - indexing and partitioning
- spreadsheet operations:
 - linking of data across worksheets
 - importing and exporting data
 - pivot table functionality
- auditing:
 - result validation and verification:
 - standardisation of format
 - cross-checking

K2.3 The purpose of logical queries and types of data query-based tools for blending data:

- purpose of logical queries:
 - to accurately search for required data
- types of data query-based tools:
 - macros – to automate operations within a spreadsheet/system
 - SQL – facilitates searches within a relational database
 - NoSQL – facilitates searches within a non-relational database

K2.4 The techniques of joining and blending data:

- data joining:
 - inner/outer join
 - full join

Knowledge - What you need to teach

- left/right join
- union join
- fuzzy matching – matching search terms that are inexact (for example, search engine queries)
- spatial matching – matching based on their spatial location (for example, emergency services allocation)
- consolidation – combining separate worksheets into one worksheet
- merging data – combining multiple datasets together in a single dataset
- linking data – reference to external/discrete data sources

K2.5 The process of designing analytical workflows:

- data gathering to support the design:
 - hard data or soft data
 - on premises/propriety
 - SaaS and analytical services
- selection of workflow components:
 - input
 - transformation
 - output
- workflow analysis of current processes
- drawing conclusions from the outcome of the analysis
- visualisation of workflow

Skills - What you need to teach

The student must be able to:

S2.1 Blend datasets from different formats (for example, spreadsheets, tables, databases):

- identify and analyse datasets and their formats in preparation for blending
- prepare and standardise each dataset for effective blending:
 - check consistency of data types
 - check compatibility of data formats
- blend datasets into final format

Skills - What you need to teach

- review quality of outcome

(GEC5, GMC2, GMC4, GMC5, GMC10, GDC1, GDC4)

S2.2 Apply techniques of joining data to create a combined dataset from a single source for a specific business requirement:

- assess the specific requirements
- select and apply appropriate joining techniques:
 - full join, inner/outer join, left/right join
 - union join
- review outcome meets requirements

(GMC4, GMC5, GMC10, GDC1, GDC4)

S2.3 Apply techniques of blending data to create a combined dataset from a single source for a specific business requirement:

- assess the specific requirements
- select and apply appropriate blending technique:
 - fuzzy matching
 - spatial matching
- review outcome meets requirements

(GEC5, GMC4, GMC5, GMC10, GDC1, GDC4)

S2.4 Design analytical workflows:

- gather relevant data to support the analysis from:
 - proprietary/on premises
 - SaaS or analytical services
- analyse gathered data
- design workflow based on the outcome of the analysis
- create visualisation of the workflow

(GMC4, GMC5, GDC1, GDC2, GDC4)

S2.5 Manipulate and link different datasets:

- identify and review the different datasets in preparation for linking
- manipulate datasets based on required data (for example, related database tables)
- establish a link to the repository
- test datasets are linked

Skills - What you need to teach

(GMC4, GMC5, GMC10, GDC1, GDC4)

S2.6 Apply data blending and joining to datasets from multiple sources and present in a specific format to meet requirements:

- review datasets in preparation for blending
- select and apply appropriate blending and joining techniques:
 - data joining
 - fuzzy matching
 - spatial matching
 - consolidation
- present datasets in appropriate format based on requirements and outcomes
- assess blending and joining outcomes

(GEC5, GMC4, GMC5, GMC10, GDC1, GDC4)

S2.7 Design and set up a dataset:

- review intended purpose of dataset
- gather relevant data
- identify appropriate design requirements:
 - data type (for example, numeric, temporal)
 - size of data (for example, volume, value, variety)
 - format of data file (for example, spreadsheet)
- set up a dataset based on identified design requirements

(GMC5, GDC1, GDC2, GDC4)

S2.8 Import and export data from a dataset:

- review the dataset
- standardise data to support import and export process (for example, quality, format, remove redundant data)
- import/export data from datasets to meet requirements
- review the import/export process to confirm completion
- comply with all appropriate security standards and legislation

(GMC2, GDC1, GDC4)

S2.9 Design and execute logical queries:

- identify and assess the purpose and parameters of the query

Skills - What you need to teach

- design query based on identified purpose and parameters
- execute using appropriate query tool (for example, SQL, NoSQL, spreadsheets)

(GEC4, GDC1, GDC2, GDC4, GDC6)

S2.10 Create spreadsheets with pivot tables:

- identify and organise spreadsheet layout
- input data into spreadsheet
- design pivot table based on required information:
 - select relevant data cells
 - select data to be analysed
 - select cell range
- create pivot table from design
- test the functionality of the pivot table

(GMC4, GMC10, GDC1, GDC2, GDC4, GDC6)

S2.11 Analyse datasets and identify data to be blended:

- assess compatibility of datasets including spreadsheets in preparation for blending
- assess data for blending:
 - quality of data (for example, data validation)
 - standardise data (for example, format)
- identify the data to be blended based on the outcome of analysis

(GMC10, GDC1, GDC4)

S2.12 Automate spreadsheet operations to meet a requirement:

- identify the requirements of the automation
- assess standardisation of data within the spreadsheet
- apply appropriate macros to complete automation
- test the automation outcome

(GDC1, GDC2, GDC4, GDC6, GEC5)

S2.13 Audit data results from outcomes:

- identify requirements of the audit
- validate data results:
 - check format is appropriate for requirements

Skills - What you need to teach

- verify data results:
 - apply cross-checking against requirements
- record outcomes of audit logically and coherently to advise future actions

(GDC1, GDC4)

Performance outcome 3: Analyse structured and unstructured data to support business outcomes**Knowledge - What you need to teach**

The student must understand:

K3.1 A range of tools and techniques for data analysis and their application in solving business problems.

Tools and techniques for data analysis:

- online analytical processing (OLAP):
 - discovering data from different sources
 - limitless report viewing
 - complex analytical calculations
 - predictive scenario planning
- spreadsheets and dashboards:
 - identifying trends and patterns
 - monitoring of KPIs
- time series analysis (for example, stationarity and seasonality)
- geospatial – enriching an existing dataset with geographical variables:
 - geographic clustering
- descriptive and diagnostic analytics:
 - programmatic data analysis – analysing data using a programming language (for example, Python using Jupyter Notebook or Google Colab Notebook for structuring and presenting analysis)
 - data visualisation
 - exploratory data analysis (EDA):
 - univariate, multivariate and bivariate analysis

Knowledge - What you need to teach

- feature engineering and feature selection
 - statistical analysis
- predictive analytics:
 - supervised machine learning
 - artificial intelligence
 - forecasting
 - simulations
 - data mining (for example, market basket analysis)
 - unsupervised machine learning (for example, clustering)

K3.2 The value of data in a business/organisation and how data analytics can be applied to improve performance and outcomes.

Value of data for business improvement	Role and application of data analytics	Success criteria to measure value
Business intelligence and insight	Research market leaders and potential customers	New products/services with unique selling points
Competitive advantage/sales and marketing	Customer insight, market analysis, targeted sales	Income, customer reach, customer satisfaction
Process improvement	Provide actionable cause and effect analysis	Waste reduction, cost, quality, lower carbon footprint
Maintenance planning	Forecasting tool performance/failure	Less downtime, cost, plan downtime

K3.3 The process for using data to solve a business problem:

- understanding:
 - discover – identify and understand the business problem (for example, new system being implemented)
 - investigate:
 - data relevance

Knowledge - What you need to teach

- data characteristics
- type
- size:
 - data availability
- preparation:
 - plan and prioritise – define an approach, select relevant data tools and data preparation (for example, finding best piece of software, planning project, working with stakeholders/users)
 - build – creation, data and blending operations (for example, build and develop systems)
- analysis:
 - perform data analysis tasks (for example, use data analysis to develop system)
- validation:
 - plan tests (for example, use testing plans to complete tests, user testing)
 - validate and audit outcomes and improvements
 - reiterate steps and perform additional analysis if desired outcome not achieved
- presentation:
 - report outcome – present and communicate results
- review:
 - gather and review feedback from presentation

K3.4 The importance and process of data preparation, modelling and testing:

- data preparation – to ensure effective use and analysis of data:
 - sourcing/identifying
 - collecting
 - cleansing
 - blending:
 - consolidating
- data modelling – provides a framework to develop understanding of future data systems:
 - conceptual data models – establishes business components, their attributes and their relationships
 - logical data models – structure of data elements and their relationships
 - physical data models – implementation of data model based on data persistence technology
- testing outcomes – to ensure the business problem is solved:

Knowledge - What you need to teach

- plan the testing approach
- appropriateness of datasets to support problem resolution
- analysis of datasets to draw conclusions and solutions:
 - use of statistical methods to identify trends and patterns
- test outcomes meet business requirements

K3.5 Types of statistical methods and their application to identify trends and patterns in data:

- clustering – used to group related data points within a dataset
- time series modelling – identifies patterns over time (for example, daily or weekly trends)
- standard deviation – variance from the mean
- regression – identifies relationship between data variables
- correlation – identifies a relationship between datasets
- chi-square test – identifies whether there is an association between categorical variables

K3.6 The application of algorithms to identify trends and patterns in data:

- summarises trends and patterns in numerical and graphical data
- identifies what methods are suitable for different applications
- forecasts based on historical trends and patterns
- supports assumptions and implications behind forecasting methods

Skills - What you need to teach

The student must be able to:

S3.1 Apply statistical methods and algorithms to identify trends and patterns in data:

- clarify requirements:
 - trends and patterns to be identified
- select appropriate statistical methods to meet requirements:
 - clustering
 - time series modelling
 - standard deviation
 - regression

Skills - What you need to teach

- correlation
- apply algorithms efficiently to meet requirements
- apply appropriate representation of the information to support the identification of trends and patterns:
 - level of detail and accuracy required
- review outcomes against requirements

(GEC1, GMC2, GMC4, GMC5, GMC7, GMC10, GDC2, GDC4, GDC5, GDC6)

S3.2 Apply the steps in data processing for a specific business requirement:

- assess the requirements
- apply the steps of data processing:
 - understanding
 - preparation
 - validation
 - analysis
 - presentation
- review the outcomes of the data processing

(GEC5, GMC2, GMC4, GMC5, GMC10, GDC3, GDC4)

S3.3 Identify relevant data for a specified business problem:

- assess the business problem to understand all components
- discover the available data sources
- assess relevant data from available sources
- investigate and review the appropriateness of the data characteristics (for example, type, size) to support the business problem
- identify and present the relevant data for the business problem

(GEC5, GMC2, GDC4)

S3.4 Build a dataset for a specific business requirement:

- identify the relevant sources of data for requirements
- gather the relevant data from identified sources
- cleanse and standardise data for blending (for example, remove, edit, parse)
- blend data using appropriate techniques
- build dataset from gathered and blended data

Skills - What you need to teach

(GMC2, GMC5, GMC10, GDC1, GDC2, GDC4, GDC6)

S3.5 Test a dataset to meet a business requirement:

- plan the approach to testing the dataset
- test the dataset against business requirements
- analyse the test results against requirements
- review the outcomes

(GMC2, GMC5, GMC10, GDC1, GDC2, GDC4)

Performance outcome 4: Interpret data and communicate a result appropriate to the audience**Knowledge - What you need to teach**

The student must understand:

K4.1 Factors and requirements of communicating data within a business:

- requirements of audience (for example, technical or non-technical, job role, level of authority):
 - specified timeframes of communication
 - prioritisation of communication
 - method of communication (for example, a presentation)
 - accessibility of communication
- purpose of the data communication (for example, telling the story of data):
 - communication's intended use
 - expected outcomes (for example, linking data back to objectives)
- content:
 - size (for example, limited word count)
 - complexity (for example, use of technical terms, levels of understanding)
 - data type (for example, text, numeric)
- review:
 - validation of communication outcome
 - meets the brief of business and audience requirements

Knowledge - What you need to teach

- utilisation of analytic services to analyse communication outcomes (for example, response rate, open rate)

K4.2 Types of visualisation techniques and their application in the presentation of data to meet a specific requirement.

Type of visualisation techniques and how to create:

- charts/graphs:
 - bar chart
 - pie chart
 - scatter graph
 - line graph
- heat maps
- flowcharts
- tables
- images/infographics
- XR
- 3D models/printing

Selection criteria for appropriate application of technique:

- considerations to meet requirements:
 - brief
 - audience
 - level of technical knowledge and skills (for example, use of technical terminology)
- role specific

K4.3 The application of digital marketing metrics to inform business decision making:

- website metrics (for example, average session, bounce rate, targeted purchases, clicks)
- email metrics (for example, open rates, location, clicks)
- social media metrics (for example, engagement, followers, likes, post views)

K4.4 Methods, techniques and formats of communicating data and results:

- data communication:
 - methods:
 - written (for example, business case)
 - verbal (for example, public speaking)

Knowledge - What you need to teach

- non-verbal (for example, visualisation techniques)
- communication techniques:
 - technical/non-technical (for example, complexity levels of language)
 - active listening
 - tailoring to audience
 - use of open questioning
 - reflection and review
 - storyboarding
 - framework for conversation
- formats:
 - presentation
 - reports
 - dashboard
 - infographics
 - video

Skills - What you need to teach

The student must be able to:

S4.1 Collaboratively review to validate results for a business problem:

- identify, clarify and analyse parameters for the review:
 - levels of technical information needed for different audiences
 - desired outcome
 - business problem
- collaboratively review and apply validation techniques to results:
 - use technical language correctly and relevant techniques to aid understanding
 - actively listen and contribute to discussions
 - summarise key points of discussions for collaboration
- analyse outcomes of review

Skills - What you need to teach

(GEC1, GEC6, GMC10, GDC3, GDC5)

S4.2 Demonstrate the ability to use a range of communication techniques:

- select appropriate communication techniques:
 - technical/non-technical
 - active listening
 - tailoring to audience
 - use of open questioning
 - reflection and review
 - storyboarding
 - framework for conversation
- apply communication techniques to demonstrate:
 - listening
 - reflection
 - use a framework for conversation
 - coherently ask and answer questions
 - develop a narrative
 - convey technical documentation
 - review

(GEC1, GEC2)

S4.3 Review the effectiveness of digital marketing through use of data analytics services and communicate results:

- identify the parameters of the review
- process and analyse results of digital marketing metrics for:
 - websites
 - email
 - social media
- draw conclusions from results of marketing metrics data:
 - predictions versus actual results
- apply appropriate visualisation techniques to communicate results (for example, graphs, heat maps, flowcharts):
 - use technical language correctly and techniques to aid understanding

Skills - What you need to teach

- organise results logically and coherently

(GEC1, GMC2, GMC4, GMC5, GMC8, GMC10, GDC1, GDC2, GDC3, GDC4, GDC5, GDC6)

S4.4 Prepare raw data and present in a visual format for a specific business requirement:

- identify raw data to meet the requirements
- prepare and standardise the raw data (for example, cleanse, format)
- assess communication requirements:
 - audience (for example, levels of knowledge)
 - content and context
- apply appropriate visualisation techniques (for example, graphs, heat maps, flowcharts)
- present data visually to meet requirements

(GEC1, GMC4, GMC5, GMC10, GDC1, GDC2, GDC4)

S4.5 Develop a specification to meet audience requirements:

- identify the requirements of the specification
- analyse and apply the factors and requirements of communicating data:
 - audience
 - purpose
 - content
 - data type
 - context
 - review
- select and apply data communication formats (for example, reports, dashboards)
- present specification and its benefits clearly

(GEC3, GMC8, GMC10, GDC1, GDC2, GDC3)

S4.6 Create materials using data points to tell a story:

- identify the requirements of the materials
- analyse and identify appropriate data points from datasets
- apply the factors and requirements of communicating data:
 - audience
 - purpose
 - content

Skills - What you need to teach

- data type
- context
- review
- apply appropriate format (for example, presentation, report)
- communicate data story clearly and effectively

(GEC3, GMC8, GMC10, GDC2, GDC3, GDC6)

S4.7 Demonstrate the ability to link data back to objectives and decision making within a business scenario:

- identify and assess the business scenario
- select and link data points to support objectives and decision making
- justify the value of selected data points
- apply appropriate data communication methods and techniques to present outcome

(GMC8, GMC10, GDC3)

Performance outcome 5: Can apply legal, ethical and professional principles when manipulating data**Knowledge - What you need to teach**

The student must understand:

K5.1 The legal and regulatory requirements that apply to data analysis.

Requirements:

- data protection and data security:
 - UK GDPR/DPA 2018:
 - 7 principles of data protection
 - data processing agreement – the agreement between a controller and processor
- intellectual property rights (IPR):
 - copyright
 - licensing
 - ownership

Knowledge - What you need to teach**K5.2 The data sharing code of practice and its applications.**

Data sharing code of practice – practical guide for organisations defining how to share personal data in compliance with data sharing legislation:

- follow good practice recommendations
- communicate to data owners (for example, understanding of their rights)
- undertake data sharing impact assessment
- create a data sharing agreement
- data processing agreements
- sharing of personal data between organisations that are controllers
- when you can give access to data to a third party
- how data sharing can take place (for example routine, scheduled or one off)
- sharing data in an emergency situation

K5.3 Where to locate the legal requirements and codes of practice, and their application in different business sectors.

Location of legal requirements and codes of practice:

- Information Commissioner's Office (ICO)
- government websites
- industry regulatory bodies
- organisational policies and procedures

Business sectors:

- education (for example, compliance with copyright)
- health (for example, sharing of medical records)
- retail (for example, storing of bank details)
- hospitality (for example, retention of personal information)

K5.4 The principles of risk management applied by a business when handling data.

Risk assessment:

- identification – identify risks that might occur when handling data within the business
- probability – likelihood of occurrence
- impact – on quality, cost and time (for example, impact to data subject)
- prioritisation – rank risks based on the quantification of probability and impact

Risk response:

Knowledge - What you need to teach

- accept – the impact of the risk is deemed acceptable
- transfer – contractually outsource the risk to another party
- avoid – change scope to avoid identified risk
- mitigate – reduce the impact or probability of the identified risk

Risk monitoring:

- periodic risk review of probability and impact
- recording (for example, risk register, lessons learned and action plans)
- ownership of risks – people responsible for the day-to-day management of a risk
- escalation – highlighting risk to appropriate authority within an organisation

Risk communication:

- communication of relevant information to relevant stakeholders
- safe handling of sensitive data
- documentation of communication

K5.5 The ethical considerations and implications when implementing and analysing data:

- consent – informed consent must be gained for use and re-use
- permissions and access – only appropriate people should have access to data
- storage and archiving – data should only be stored when needed
- re-use – clearly defined purpose of re-use of data in line with consent
- avoiding bias – when using automation, machine learning or of the individual conducting the analysis
- privacy – protecting the data subject at individual and organisation level
- impact – effect on individual or organisation
- ownership – who owns the data in the analysis
- third-party – sharing data with external organisations

K5.6 The ethical and moral issues of enhancing technology and reliance on data:

- autonomous operation:
 - reduced skill level of manual workforce
 - dehumanisation of decision making (for example, algorithms, profiling)
 - reduced employment (for example, shift in skills towards higher digital requirements)
- changing behaviours:
 - isolation due to availability of data (for example, online banking/retail, education)

Knowledge - What you need to teach

- reduction in physical social skills (for example, body language awareness)
- accessibility:
 - increased/constant access
 - risk of addiction (for example, constant access to gaming, gambling, shopping)
- privacy:
 - unauthorised media (for example, filming without consent)
 - cyberstalking/attacks (for example, identity theft, social engineering)

K5.7 The means of attack posed on a business by different threat actors.

Means of attack:

- physical – damage to digital systems or environment
- social engineering – manipulation of people or situations to gain information
- cyber attack – attempts to damage, disrupt or gain unauthorised access to computer systems, networks or devices

K5.8 The methods, security controls and procedures to reduce the risk and impact of attacks.

Methods:

- business continuity plan (BCP) – planning and managing business continuity during a disruptive event
- disaster recovery plan (DRP) – restoring normal business operations following a disaster (for example, flood)
- acceptable use policies
- staff training (for example, CPD)
- compliance with requirements (for example, the 10 steps to cyber security, ISO 27001)

Security controls and procedures:

- anonymisation/pseudonymisation
- encryption
- segregation
- access control
- change monitoring

K5.9 The potential impacts of cyber attacks on organisations and individuals.

Impacts on organisations:

- financial penalties
- reputation (for example, loss of custom)

Knowledge - What you need to teach

- legal consequences (for example, UK GDPR/DPA 2018 penalties)

Impacts on individuals:

- financial (for example, identity theft)
- emotional (for example, extortion)

K5.10 Marketing consent within regulations of data protection and Consent Lifecycle Management.

- consent – types of data may require consent for use (for example, personal information)
- principles of marketing consent:
 - consent not assumed
 - freely given
 - specific
 - informed
 - unambiguous
- recording of consent:
 - who has given consent
 - date of consent
 - scope of consent
 - indication signifying agreement
- Consent Lifecycle Management:
 - withdrawal of consent
 - renewal of consent
- relevant regulation:
 - The Privacy and Electronic Communications (EC Directive) Regulations 2003 (PECR)
 - UK GDPR/DPA 2018

K5.11 The term personal identifiable data and the techniques applied to remove personal identification for primary and secondary data usage:

- personal identifiable data – any data that could be used to identify a particular person (for example, name)

Techniques applied to remove personal identification:

- UK GDPR/DPA 2018 definition of personal identifiable information:
 - right to erasure
- privacy impact assessment

Knowledge - What you need to teach

- methods of aggregation
- anonymisation of data
- primary and secondary use – understanding when anonymisation and aggregation can and should be used

K5.12 The standard data protection roles and their responsibilities.

Roles:

- data protection officer:
 - ensures compliance with data protection legislation
 - formal point of contact for regulators
 - identifies the need and quality assures the policies developed for compliance with regulations
 - educates staff in data protection
 - ensures data protection standards are met
- data controller:
 - responsible for management of organisational data
 - defines the purpose or outcome of data
- data processor:
 - performs tasks on the data as instructed by the data controller
 - collects data
 - delivers in line with the agreement with the controller

Skills – What you need to teach

The student must be able to:

S5.1 Source regulatory and legal information relevant to data analysis:

- identify relevant regulatory and legal information required from appropriate sources (for example, IPR)
- locate regulatory and legal information

(GDC6)

S5.2 Locate and apply guidelines and rules in relation to data handling regulations:

- identify relevant business guidelines and rules
- analyse and interpret guidelines and rules in relation to data handling

Skills – What you need to teach

- apply relevant business guidelines and rules when handling data

(GEC5)

S5.3 Implement data safely and ethically for intended purposes:

- identify the intended purpose and implementation of data:
 - investigations
 - processes
 - procedures
- assess ethical implications:
 - check for informed consent
 - appropriate permissions/access
 - store data securely
 - protect data subject
- implement data effectively for identified purpose
- comply with organisational data policies and procedures

(GDC1, GDC4, GDC6)

S5.4 Apply the principles of risk management for a specific purpose:

- apply the risk assessment process to identify and quantify risk:
 - identification
 - probability
 - impact
 - prioritisation
- mitigate risk based on outcome of risk assessment
- monitor and record all risk using a framework/template (for example, risk register)

(GMC6)

S5.5 Demonstrate an understanding of methods to reduce the risk and impact of attacks:

- identify privacy and security concerns in different contexts
- analyse the risk and impact of attacks
- select and explain the appropriate methods, security controls or procedures (for example, DRP, encryption) to meet the outcome of analysis
- explain how selected response complies with regulations and standards

Skills – What you need to teach

- record and document responses and outcomes clearly and concisely

(GDC2)

S5.6 Apply and maintain procedures and security controls to maintain confidentiality, integrity and availability of data:

- select the appropriate security controls and procedures for the task
- apply appropriate controls and procedures
- maintain and monitor controls and procedures against requirements

S5.7 Comply with relevant regulations when using personal identifiable data:

- analyse and interrogate the personal identifiable data
- identify which legal and regulatory requirements are applicable to the assessed personal data
- identify and apply relevant actions to comply with legal and regulatory requirements when using personal identifiable data

(GMC6, GDC4, GDC5)

Performance outcome 6: Discover, evaluate and apply reliable sources of knowledge**Knowledge – What you need to teach**

The student must understand:

K6.1 The role of data in supporting digital interactions across the digital landscape.

Digital interactions and processes (for example, customer centricity):

- transactional data:
 - purchasing (for example, invoices, statements, credit)
- booking data:
 - reservations (for example, availability, peak and off-peak pricing)
- recording and monitoring of data (for example, digital footprint):
 - online applications (for example, access, targeted marketing across applications)
 - physical world (for example, location, transactions across multiple sites)
 - smart devices (for example, virtual assistant, home management)
 - internet of things (IoT)

Knowledge – What you need to teach

- technologies (for example, building management, transportation, manufacturing)

K6.2 Types of sources of knowledge that can be applied within a digital business context.

Sources of knowledge:

- academic publications (for example, textbooks, research journals and periodicals)
- search engines (for example, Google, Bing)
- websites (for example, wikis, forums, statistical websites)
- social media (for example, analytics)
- blogs/vlogs (for example, reviews of new technologies, opinions on topical issues in the digital sector)
- professional networks (for example, conferences)
- e-learning (for example, massive open online courses (MOOCs), recognised vendor qualifications)
- peers (for example, colleagues, network contacts, other industry professionals)

K6.3 The factors of reliability, validity and bias that can be applied to legitimise sources of knowledge.

Factors of reliability and validity:

- industry-certified accreditation
- appropriateness of data
- based on fact/evidence:
 - citations
 - filtering out malicious data (for example, fake news)
- relevant context
- credibility of author:
 - affiliated to specific bodies (for example, government, industry regulators)
 - reputation
 - experience (for example, relevant qualification in subject)
- target audience – produced with specific audience requirements taken into consideration (for example, use of technical/non-technical terminology)
- publication:
 - version (for example, use of the current version)
 - date of publication (for example, is the content outdated?)

Factors of bias:

- types of conscious and unconscious bias:

Knowledge – What you need to teach

- author/proprietary bias – unweighted opinions of the author or owner
- confirmation bias – sources support a predetermined assumption
- selection bias – selection of sources that meet specific criteria
- cultural bias – implicit assumptions based on societal norms
- indicators of bias within sources:
 - partiality
 - prejudice
 - omission
- avoiding bias:
 - based on fact/evidence
 - be inclusive:
 - full representation of demographics
 - be objective

K6.4 The process of critical thinking and the application of evaluation techniques and tools.

The process of critical thinking:

- identification of relevant information and data:
 - different arguments, views and opinions
- analysis of identified information and data:
 - identify types of bias and objectivity
 - understand links between information and data
- selection of relevant evaluation techniques and tools
- evaluation of findings and drawing of conclusions
- recording of conclusions

Evaluation techniques:

- formative evaluation
- summative evaluation
- qualitative (for example, interviews, observations, workshops)
- quantitative (for example, experiments, surveys, statistical analysis)
- benchmarking
- corroboration:

Knowledge – What you need to teach

- cross-referencing
- triangulation

Evaluation tools:

- gap analysis
- KPI analysis
- score cards
- observation reports
- user stories/diaries
- scenario mapping
- self-assessment frameworks
- maturity assessments

K6.5 The types of data communication methods and their appropriate application within a business:

- visualisation:
 - infographics
 - graphs/charts
- dashboards
- audiovisual
- extended reality (XR):
 - virtual reality (VR)
 - augmented reality (AR)
- cross channel engagement:
 - brand consistency
 - integrated platform usage
 - platform parameters (for example, character limit, privacy settings)

Skills – What you need to teach

The student must be able to:

S6.1 Identify sources of knowledge (up to 3) and apply factors that legitimise their use to meet requirements:

- identify and clarify the parameters of the requirements
- identify appropriate sources of knowledge (for example, search engines, blogs)
- apply the factors of reliability and validity to the identified sources (for example, authority, date of publication)
- assess and review potential bias of sources and malicious data
- assess and review the identified sources' appropriateness to meet the requirements

(GEC4, GDC1)

S6.2 Search for information to meet a specific data requirement and corroborate across multiple sources:

- identify and clarify the parameters of the search (for example, explore the future of the digital economy, identify trends in big data)
- identify the sources of data that contain the required information
- safely and securely search the sources for the information required
- corroborate sources by applying cross-referencing across multiple sources
- apply reliability and validity factors
- assess and review potential bias of sources

(GEC4, GDC5)

S6.3 Select and apply techniques and tools to support evaluation for a business requirement:

- identify and clarify the parameters of the evaluation
- select appropriate techniques and tools to support evaluation
- apply the evaluation techniques and tools appropriately
- record the findings of evaluation for the requirement

(GEC4, GDC2)

S6.4 Compare and rationalise the actions taken to ensure the reliability and validity of sources:

- identify and compare possible actions to ensure reliability and validity
- apply the relevant reliability and validity factors to the sources
- compare the outcomes of the validity and reliability actions

Skills – What you need to teach

- explain and recommend the choice of action to ensure the sources are valid and reliable, using appropriate technical terms

(GEC1, GEC3, GEC5, GDC3)

S6.5 Identify and understand bias when using sources of knowledge and data:

- identify bias where datasets are non-representative
- analyse data to identify indicators of bias
- explain clearly and concisely how bias can be created within a source
- explain clearly and concisely how bias could be avoided within sources

(GEC1, GEC3, GEC5, GDC3)

S6.6 Demonstrate critical thinking when using sources of knowledge:

- apply the process of critical thinking to meet requirements:
 - identify relevant information and data
 - analyse the information and data
 - select and apply appropriate evaluation techniques and tools
 - evaluate findings to draw conclusions and to identify the best use of digital technologies
 - organise and record conclusions logically

(GEC1, GEC3)

Section 5: TQ glossary

TQ specification

Route core

The core knowledge and understanding across the technical qualification route.

Occupational specialism

The requirements for the technical qualification occupational specialism.

Student

The person studying the technical qualification ('The student must...').

Tutor

The individual delivering the technical qualification.

Provider

The centre delivering the technical qualification.

Series

Assessments that must be attempted in the same assessment window, for example paper A and paper B of the core examination.

Assessment mode

The assessment mode is how an assessment is made available and/or administered to students. For example, a written examination can be administered to students via an on-screen platform or via a traditional paper-based document.

Section 6: Additional information

Annual monitoring visits

Our quality assurance team will monitor all approved TQ providers on an ongoing basis. All providers delivering the TQ will be quality assured at least once a year to ensure that they are delivering in line with required standards. Annual monitoring reviews will be carried out either face-to-face or remotely by quality assurers appointed, trained and monitored by us. Providers will be allocated a quality assurer upon approval. Our quality assurers will complete a report following each annual review to record and share their findings.

Guided learning hours (GLH)

Guided learning is the activity of a student being taught or instructed by – or otherwise participating in education or training under the immediate guidance or supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training.

For these purposes, the activity of ‘participating in education or training’ shall be treated as including the activity of being assessed, if the assessment takes place under the immediate guidance or supervision of a lecturer, supervisor, tutor or other appropriate provider of education or training.

Total qualification time (TQT)

Total qualification time is an estimate of the minimum number of hours that an average student would require in order to complete a qualification.

TQT comprises:

- the GLH for the qualification
- an estimate of the number of hours a student will likely spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by – but not under the immediate guidance or supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training

Essential skills

While completing this qualification, students may develop the knowledge, understanding and essential skills employers look for in employees. These range from familiar ‘key skills’, such as team working, independent learning and problem solving, to more tricky-to-measure skills, such as:

- appropriate workplace behaviour and dress
- appropriate interpersonal skills
- communicating with professional colleagues/peers and/or hierarchical seniors
- supporting other aspiring employees

- personal manners
- understanding work practices and how different roles and departments function within an organisation

Recognition of prior learning

Recognition of prior learning (RPL) may be applied to the route core content only.

Providers may, at their discretion, recognise prior learning if they are satisfied that the evidence provided meets the qualification's requirements.

For more information, please refer to the recognition of prior learning (RPL) credit accumulation and transfer (CAT) policy on the NCFE website.

Qualification dates

We review qualifications regularly, working with sector representatives, vocational experts and stakeholders to make any changes necessary to meet sector needs and to reflect recent developments.

If a decision is made to withdraw a qualification, we will set an operational end date and provide reasonable notice to our providers. We will also take all reasonable steps to protect students' interests.

An operational end date will only show on the regulator's qualification database and on our website if a decision has been made to withdraw a qualification. After this date, we can no longer accept student registrations.

This qualification has external assessments, which can only be taken up to the last assessment date set by us. No external assessments must be permitted after this date, so students must be entered in sufficient time. Please visit the NCFE website for more information.

Staffing requirements

Providers delivering any of our qualifications must:

- have a sufficient number of appropriately qualified/experienced tutors to deliver the TQ to the volume of students they intend to register
- have experience of delivering level 3 qualifications and preparing students for written and project-based assessments
- ensure that all staff involved in delivery are provided with appropriate training and undertake meaningful and relevant continuing professional development
- implement effective processes to ensure all delivery is sufficient and current. This should include standardisation to ensure consistency of delivery
- provide all staff involved in the delivery process with sufficient time and resources to carry out their roles effectively
- ensure staff have an industry focus when delivering content

Core staffing requirements

Staff involved in the delivery of the route core content must be able to demonstrate that they have (or are working towards) the relevant occupational knowledge and/or occupational competence in digital business, at the same

level or higher than the qualification being delivered. This may be gained through experience and/or qualifications. Understanding of the wider digital sector would be beneficial, including:

- relevant legislation
- emerging technologies within the digital sector
- industry standard operating procedures
- cloud technologies
- application of digital approaches and solutions to problem solving
- network principles and architecture
- data analytics and how data driven decisions influence business decision making
- project management (specifically within the digital sector)

Occupational specialism staffing requirements

Staff involved in the delivery of the occupational specialism content must be able to demonstrate that they have (or are working towards) the relevant occupational knowledge and/or occupational competence in the relevant occupational specialism area, at the same level or higher than the qualification being delivered. This may be gained through experience and/or qualifications, including:

- data analytics and how data driven decisions influence business decision making
- data handling and processing
- data quality issues and how to cleanse them
- relevant legislation (for example, UK GDPR)
- spreadsheet operation and manipulation
- structured query languages (for example, MySQL, MS SQL)
- algorithms and automation

Resource requirements

Providers must ensure that the student has access to the necessary materials, resources and workspaces for delivery and assessment of mandatory knowledge and skills. The following lists are not exhaustive. Please refer to the qualification content for a more detailed indication of the required resources.

General:

- computer
- internet access
- audio/visual recording equipment
- software:
 - word processing (for example, MS Word, Google Docs)

- presentation (for example, MS PowerPoint, Google Slides)
- spreadsheet (for example, MS Excel, Google Sheets)
- project management (for example, MS Excel, MS Project)
- basic image editing software (for example, Photoshop, GIMP)
- programming software (for example, TextEdit)
- database software (for example, MS SQL, phpMyAdmin)
- web browsers (for example, Chrome, Firefox, Edge)
- data sources (for example, online, social media, analytical)
- research resources (for example, online, books, journals)
- a web server

Customer support team

Our customer support team will support you with approvals, registrations, moderation, external assessment, results and general queries.

Fees and pricing

Fees will be made available to eligible and approved providers.

Training and support for providers

Our provider development team's primary purpose is to support providers and teaching teams in the delivery of this qualification. There are a number of ways in which we can do this, which include:

- providing bespoke one-to-one support with the delivery staff
- delivering face-to-face events at numerous locations throughout the country
- facilitating delivery and CPD webinars
- signposting you to teaching and learning resources
- providing you with delivery updates on the technical qualification

The variety of support available includes:

- content structure
- teaching strategies
- SEN guidance
- quality assurance
- assessment preparation and blended learning

Should you wish to discuss your teaching and delivery requirements, please email:
provider.development@ncfe.org.uk.

Useful websites and sources of information

ICO: <https://ico.org.uk>

IEEE: www.ieee.org

Telecommunications Industry Association (TIA): <https://tiaonline.org/>

Scrum: www.scrum.org

Google Quantum AI: <https://quantumai.google>

The National Cyber Security Centre: www.ncsc.gov.uk

Digital, Data and Technology Profession Capability Framework: www.gov.uk/government/collections/digital-data-and-technology-profession-capability-framework

Cisco: www.cisco.com/c/en_uk/index.html

DataViz: <https://datavizproject.com>

Learning resources

We offer a wide range of bespoke learning resources and materials to support the delivery of this qualification, which include:

- schemes of work
- tutor delivery guides

For more information on the resources being developed for this qualification, please check the qualifications page on the NCFE website.

Equal opportunities

We fully support the principle of equal opportunities and oppose all unlawful or unfair discrimination on the grounds of ability, age, colour, culture, disability, domestic circumstances, employment status, gender, marital status, nationality, political orientation, racial origin, religious beliefs, sexual orientation and social background. We aim to ensure that equality of opportunity is promoted and that unlawful or unfair discrimination, whether direct or indirect, is eliminated both in our employment practices and in access to qualifications. A copy of our Diversity and Equality Policy is available on request.

Diversity, access and inclusion

Our qualifications and associated assessments are designed to be accessible, inclusive and non-discriminatory. We regularly evaluate and monitor the 6 diversity strands (gender, age, race, disability, religion, sexual orientation) throughout the development process as well as throughout the delivery, external quality assurance and external assessment processes of live qualifications. This ensures that positive attitudes and good relations are promoted, discriminatory language is not used and our assessment procedures are fully inclusive.

Access Arrangements and Reasonable Adjustments Policy

This policy is aimed at anyone who uses our products and services and who submits requests for access arrangements and reasonable adjustments. Students who require access arrangements and reasonable adjustments should discuss their requirements with their tutor.

The most up-to-date version of the policy can be found on the NCFE website where providers can find details of how to request an access arrangement and reasonable adjustment.

Contact us

NCFE

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* To continue to improve our levels of customer service, telephone calls may be recorded for training and quality purpose

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Owner: Content Solutions Manager

Change history record

Version	Description of change	Approval	Date of issue
v1.0	Post approval, updated for publication		December 2020
v1.1	Update of section: About this TQ Specification to remove draft information		January 2021
v1.2	Updates to Sections 1 and 4 (Institute reference: ODSR_DBS_001 – ODSR_DBS_005)		March 2021
v1.3	Branding updated Updates to Sections 1, 2 and 4 (Institute reference ODSR_DBS_007- ODSR_DBS_020)		September 2021
v1.4	House style update to section 2 (Institute reference ODSR_DBS_025)	October 2021	January 2022
v1.5	Assessment requirement clarification (ODSR_DBS_056)	December 2021	February 2022
v2.0	The following amendments have been made to this qualification specification following annual review. General changes:	May 2023	19 June 2023

	<ul style="list-style-type: none"> • clarification provided regarding registering students on T Levels and transferring between T Levels and occupational specialisms • updates to grading tables and grade descriptors • legislation or regulations have been updated with current dates, where applicable • updated websites and sources of information • updated resource requirements • updated training and support for providers information • updated assessment information <p>Amendments made to the core component section:</p> <ul style="list-style-type: none"> • in R5.1, reference to ‘redundant array of independent disks (RAID) card’ has been removed • in R1.10, reference to ‘user experience’ has been updated to ‘improved user experience’ • in R5.3, reference to ‘User Datagram Protocol (UDP)’ has been included • in R10.3, reference to ‘social engineering’ has been added • in R12.1, reference to ‘sprints’ have been removed • in R7.2, reference to ‘green computing’ has been added <p>Amendments made to the Digital Business occupational specialism section, including:</p> <ul style="list-style-type: none"> • in K5.2, additional bullet points regarding data sharing code of practice and its applications have been added, including: <ul style="list-style-type: none"> ○ sharing of personal data between organisations that are controllers ○ when you can give access to data to a third party ○ how data sharing can take place (for example, routine, scheduled or one off) ○ sharing data in an emergency situation 		
v3.0	<p>The following amendments have been made to this qualification specification following annual review.</p> <p>General changes:</p> <ul style="list-style-type: none"> • website hyperlinks have been updated or replaced, where required • reference to ‘continuous professional development’ has been amended to ‘continuing professional development’ • industry placement experience section has been updated 	April 2024	29 April 2024

	<ul style="list-style-type: none"> • wording in 'how the qualification is assessed' section has been updated to support clarity and understanding of requirements <p>Amendments made to Section 1:</p> <ul style="list-style-type: none"> • information regarding specification updates and amends has been added <p>Amendments made to Section 2:</p> <ul style="list-style-type: none"> • in the GLH and TQT section, TQT has been updated for the Route core component and OS • the section regarding the 'transition programme' information has been updated • the employer set project – 'subject content to be assessed' section has been updated to include core knowledge and core skills <p>Amendments made to the core component section:</p> <ul style="list-style-type: none"> • in R1.2, 'competitors' has been added as an example of economic factors • in R1.7, reference to 'competitors' has been moved to become a sub-bullet under 'economic' • in R1.11, reference to 'poor user experience' has been added as a sub-bullet under 'audience exclusion' • in R1.12, reference to 'Twitter' has been updated to 'X' • in R1.13 terminology has been updated to ensure language is inclusive, including amending 'white hat/ethical hacker' to 'authorised hacker', 'grey hat hacker' to 'semi-authorised hacker' and 'black hat hacker' to 'unauthorised hacker' • in R3.9, 'rule-based access control (RuBAC) – restricts or allows access to resources based on rules that are independent to the user's role' has been added as an additional bullet point • R7.2 has been amended to 'Areas of emerging or evolving technology and innovative applications within a commercial and domestic context:' • in R8.1, reference to the Health and Safety (Miscellaneous Amendments) Regulations 2002 has been added • in R10.1, reference to 'passkeys' has been added as a sub-bullet to 'access information' • in R11.3, terminology has been updated to ensure language is inclusive, including, amending 'black box testing' to 'unknown environments testing' and 'white box testing' to 'known environments testing' 		
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	<p>Amendments made to the Data Technician occupational specialism:</p> <ul style="list-style-type: none">• in K2.4 and S2.2, reference to 'outer join' has been added• in K3.1, reference to 'bivariate' has been added under 'exploratory data analysis (EDA)'• in K5.5, reference to 'the individual conducting the analysis' has been added to 'avoiding bias'• in K5.9, reference to 'blackmail' has been amended to 'extortion', to ensure language is inclusive• in K5.10, reference to 'The Privacy and Electronic Communications (EC Directive) Regulations 2003 (PECR)' has been updated• in S5.4, reference to 'template' has been added, to now read 'monitor and record all risk using a framework/template' <p>Amendments made to section 6:</p> <ul style="list-style-type: none">• information on how to access the access arrangements and reasonable adjustments policy has been updated		
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