T-LEVELS | IfATE Institute for Apprenticeships and Technical Education

T Level Technical Qualification in Animal Care and Management

Specification

First teaching from September 2024

Version 1.0

City & Guilds

Qualification at a glance

T Level route	Agriculture, Environmental and Animal Care
T Level pathway	T Level Technical Qualification in Animal Care and Management
City & Guilds number	8717
Age group approved	16-18
Entry requirements	Formal entry requirements are not set by City & Guilds. However, it is expected that Learners have the appropriate attainment at Level 2 before commencing their studies.
Assessment	Core - Knowledge test is externally assessed Core - Employer-set Project is externally assessed Occupational Specialisms are externally set, externally moderated and externally marked
First registration	September 2024

Title and level	City & Guilds number	Qualification number (QN)
T Level Technical Qualification in Animal Care and Management (Level 3)	8717	610/4158/0

Version and Date	Change detail	Section
v1.0 May 2024	Approved version	

We would like to take this opportunity to thank all the employers, trade associations, professional bodies, providers, universities, subject matter experts and consultants who have dedicated time to review and validate the specifications and TQ documentation. This collaborative work is to ensure that a learner studying the Animal Care and Management T Level has the best opportunities available to them as they progress through their career with a solid base as a starting point.

- Bishop Burton College
- Cirencester College
- Derby College
- Halesowen College
- Luminate College
- MidKent College
- New College Swindon
- Northumberland College
- Oaklands College
- Plumpton College
- South Gloucester College
- City of Bristol College
- South Essex College
- South Staffs College
- Suffolk New College
- SMB Group
- Cornwall College
- Hartpury College
- Bridgewater & Taunton College
- West Suffolk College
- Writtle College
- Wakefield College
- Lancaster & Morecambe College
- Hopwood Hall College
- Wiltshire College
- Doncaster Colleges Group
- Windsor Forest Group
- Kirklees College
- Havant & South Downs College
- Inspire Education Group
- Macclesfield College
- The Manchester College
- West Notts College
- Hereford, Ludlow & North Shropshire College
- East Coast College
- Blackpool & The Fylde College
- Reaseheath College
- Dudley College
- Capel Manor College

- Bexhill College
- Wigan & Leigh College
- East Durham College
- Petroc College
- New College Swindon
- Chichester College
- City & Islington College
- Askham Bryan College
- Sheffield College
- Bedford College
- Riverside College
- Kendal College
- Barnsley College
- Basingstoke College of Technology
- Myerscough College
- Heart of Yorkshire College (Wakefield)
- South Staffs College
- NESCOT
- St Helens College Group
- University of Liverpool
- Crocodiles of the World
- RSPCA
- Essex Breeding Centre
- ROARR Dinosaur Adventure
- The Dog Training Company Ltd
- Longcroft Luxury Cat Hotel Group
- Tiggywinkles Animal Hospital
- Summit Groomer Training Group
- Look North Grooming & Training Centre
- University of Lincoln
- Hartpury University and College
- Writtle University College
- Aberystwyth University
- Bangor University
- University of Nottingham
- Harper Adams University

The Outline Content for the T Level Technical Qualification in Agriculture, Environmental and Animal Care: Animal Care and Management has been produced by T Level panels of employers, professional bodies based on the same standards as those used for Apprenticeships. The outline content can be found on the institute website:

www.instituteforapprenticeships.org/t-levels/approved-t-level-technical-qualifications-and-final-outline-content/

City & Guilds has amplified the Outline Content to create the Technical Qualification specifications.

Contents

1 Introduction

What is this qualification about?

The following purpose statement relates to the **T Level [1] Technical Qualification in Animal Care and Management (Level 3)**

Area	Description
Overview	
What is a T Level?	T Levels are new courses which will follow GCSEs and will be equivalent to three A Levels. These two-year courses have been developed in collaboration with employers and businesses so that the content meets the needs of industry and prepares learners for work. T levels are one of three post 16 options for young people, which are: • A Levels • Apprenticeships • T Level
How does the Technical Qualification work within the T Level?	This Technical Qualification specification contains all the required information you need to deliver the qualification in the T Level Technical Qualification in Animal Care and Management (Level 3). The Technical Qualification forms a significant part of the T Level in Agriculture, Environmental and Animal Care. City & Guilds are responsible for the development and ongoing operational delivery of this Technical Qualification. All other parts of the T Level as listed below will need to be achieved by a Learner for the Department for Education to award the successful completion of this T Level. It is important to note that City & Guilds do not have responsibility of delivery for the other parts of the T Level but will continue to support centres where they can on all aspects of T Level delivery. Additional mandatory parts of the T Level that need to be achieved: • An industry placement of 315–350 hours (45–50 days).
Who is this qualification for?	This qualification is for you if you are a 16–18-year-old learner, who wishes to work within the Animal Management industry. It has been designed to deliver a high level of knowledge about the industry as well as the occupational skills required to enter the industry (known as 'threshold competence'). A learner who

	completes this qualification is well placed to develop to full occupational competence with the correct support and training.
What does this qualification cover?	The qualification will help you gain an understanding of the Animal Management industry, and you will cover topics such as: • Health and safety • Business • Working in the agriculture, environmental and animal care sector • Sustainability. A learner will have the choice of studying one standalone Occupational Specialism as listed below: • Animal Management and Behaviour • Animal Management and Science. Centres and providers work with local employers who will contribute to the knowledge and delivery of training. Employers will provide demonstrations and talks on the industry and where possible work placements will also be provided by the employers.
What could this qualification lead to?	
Will the qualification lead to employment, and if so, in which job role and at what level?	This Technical Qualification focuses on the development of knowledge and skills needed for working in the Animal Care and Management sector, which will prepare learners to enter the industry through employment or as an Apprentice. Furthermore, the completion of this qualification gives the learner the opportunity to progress onto higher education courses and training.
Why choose this qualification?	This Technical Qualification will suit someone who is not yet employed or looking to enter the industry post mainstream education. The structure of the qualification is designed to give learners the breadth of knowledge and understanding across the Animal Care and Management industry but also equips them with necessary occupational and core skills to enter the industry. This qualification is designed to support fair access and allows learners to manage and improve their own performance.
Who supports this qualification?	
Employer route panels	The content of this qualification is outlined by a representative panel of employers from across the industry sector. It therefore prescribes the minimum knowledge and skills required to enter the industry. The content in this specification is approved by the Institute for Apprenticeships and Technical Education (IfATE).

Key information

Below is a summary of the key information provided to centres to support delivery of this Technical Qualification.

Guided learning hour (GLH) value

This value indicates the average number of guided learning hours a unit will require for delivery to a learner. This includes contact with tutors, trainers or facilitators as part of the learning process, and includes formal learning such as classes, training sessions, coaching, seminars and tutorials. This value also includes the time taken to prepare for, and complete, the assessment for the unit. Guided learning hours are rounded up to the nearest five hours.

Total qualification time (TQT) value

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

Criteria

This section of the specification outlines the subject or topic that needs to be delivered and assessed. Criteria are often supported by **'range'**, which provides the detail of the information required to be delivered as part of that topic. For example, with 'legislation' as the topic, the range would list all relevant animal legislation to be covered in delivery and assessment.

What do learners need to learn?

The primary purpose of these sections is to support the delivery of the content in the criteria. These sections provide context in relation to the depth and breadth to which a subject or topic needs to be taught.

Skills

This section provides a mapping reference to the core, maths, English and digital skills that are embedded within the Technical Qualification content.

Example

6.1 **Characteristics** protected by equality legislation.

Range:

Characteristics – Age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion/belief (including lack of belief), sex, sexual orientation.

What do learners need to learn?	Skills
The purpose of current equality and diversity legislation and the protected characteristics detailed under the Equality Act 2010, Employment Rights Act 1996, Human Rights Act 1998 and trade unions, including its application in the workplace.	CSA, CSC, CSE, EC4, EC5.

T Level structure

To achieve the T Level, learners must meet all requirements of the T Level framework of which the Technical Qualification is one part. Learners have to successfully complete an industry placement and any other requirements set by the Institute for Apprenticeships and Technical Education (IfATE) such as licence to practice qualifications.

Technical qualification structure

The Technical Qualification is made up of **two** components all of which need to be successfully achieved to attain the Technical Qualification as well as the full T Level Technical Qualification in Agriculture, Environmental and Animal Care: Animal Care and Management (Level 3).

The common core component:

The core component is made up of the common core and the core pathway. The common core content is designed to offer sufficient breadth of knowledge for the learner to apply in a variety of contexts related to the Agriculture, Environmental and Animal care industry and those Occupational Specialisms linked to this T Level.

The common core content is the building blocks of knowledge and skills that will give a learner a broad understanding of the industry and job roles. At the same time, it will develop the core skills they will need to apply when working within the industry.

The core pathway content is designed to offer sufficient breadth of knowledge for the learner to understand contexts related to a particular sector/sector in the Agriculture, Environmental and Animal care industry and those Occupational Specialisms linked to this T Level.

The core pathway content is the building blocks of knowledge that will give a learner a broad understanding of an Occupational Specialism industry sector/sectors, and at the same time, will develop the core skills they will need to apply when working within the industry.

Occupational Specialisms:

Occupational Specialisms develop the knowledge, skills and behaviours necessary to achieve threshold competence in an occupation. Threshold competence is defined as when a learner's attainment against the knowledge, skills and behaviours is of a standard for them to enter the occupation and industry. They must also demonstrate the ability to achieve occupational competence over time with the correct support and training.

To achieve the **T Level Technical Qualification in Animal Care and Management (Level 3) (delivered by City & Guilds)**, learners must complete **two** components of the Technical Qualification. These are known as the core components and the Occupational Specialism component. Learners must also ensure they complete a core pathway in the same industry sector as their chosen Occupational Specialism:

- (300) plus one from (305 and 306) plus one from (407 and 408)

T Level Technical Qualification in Animal Care and Management					
Programme of study (POS) number	**City & Guilds component number**	**Component title**	**Component level**	**GLH**	**TQT**
8717	**Mandatory common core component**				
	300	Agriculture, Environmental and Animal Care	3	160	226
	Choose one mandatory core pathway				
	305	Animal Management	3	210	290
	306	Animal Science	3	210	290
	Choose one standalone Occupational Specialism component				
	407	Animal Management and Behaviour	3	970	1420
	408	Animal Management and Science	3	1030	1550

2 Centre requirements

Approval

All eligible providers must obtain Full Provider Approval with City & Guilds prior to delivering any T Level Technical Qualification (TQ).

Provider approval is not equivalent to centre approval; any provider which is already an existing City & Guilds approved centre must still obtain Full Provider Approval in the first instance. There is no fast-track approval for these qualifications.

Once successfully approved, providers can apply for additional TQs or apply to add additional Occupational Specialisms (OS) during each approval window.

The approval application consists of a comprehensive set of approval criteria agreed with the Institute to ensure an eligible provider is fit and ready to deliver T Level Technical Qualifications.

These criteria seek to ensure the integrity of the qualifications for both City & Guilds and the Institute. They must be adhered to throughout the delivery of the TQ and will be reviewed at the annual self-assessment.

Criteria A Management systems
Criteria B Industry placement
Criteria C Resources
Criteria D Delivery
Criteria E Secure live assessment and administration
Criteria F Assessment and standardisation plan
Criteria G Conflicts of Interest (COI)

Please refer to our published provider approval and quality assurance information document available on our website here. This document includes information around the approval process, criteria for approval and the timeline for the relevant academic year.

Resource requirements

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

Centre staffing

Staff delivering and assessing these qualifications should be able to demonstrate that they meet the following requirements. They should:

- be occupationally competent and qualified at or above the level they are delivering
- have maths and English at Level 2 or be working towards this level of qualification
- be able to deliver across the breadth and depth of the content of the qualification being taught
- have recent relevant teaching and assessment experience in the specific area they will be teaching, or be working towards this
- demonstrate continuing CPD
- have experience or training in the following to support the delivery of this Technical Qualification:
    - delivering project-based qualifications
    - preparation for examination-based assessments.

Agriculture, Environmental and Animal Care Common Core

Staff who are familiar with Level 3 Land and Animal qualifications will be able to teach the core elements.

Occupational Specialisms specific requirements

Staff delivering the Occupational Specialisms must be able to demonstrate that they meet the following requirements:

- Be technically competent in the areas in which they are delivering to a Level 3 standard or above
- Be able to deliver across the breadth and depth of the content of the qualification being taught
- Have recent, relevant teaching and assessment experience in the specific area they will be teaching, or be working towards this
- Demonstrate continuing CPD.

It is recommended that staff assessing these qualifications must meet the above requirements and hold or be working towards a relevant recognised assessor qualification such as a Level 3 Certificate in Assessing Vocational Achievement and continue to practise to that standard. Assessors who hold earlier qualifications (D32, D33 or TQFE/TQSE) should have CPD evidence that meets current standards.

Physical resources

Centres must be able to demonstrate that they have access to the equipment and technical resources required to deliver this qualification and its assessments in line with the species requirements outlined in each performance outcome.

Centres must have access to a range of animal species and have sufficient animals so that animal welfare standards are kept. Assessment of technical skills will be carried out against both mammals and another taxa.

Animal Management and Behaviour

	Mammals	Birds	Reptiles and Amphibians	Aquatics	Invertebrates
Handling and restraint equipment	Could include: • baskets • collars • leads • plastic holding tanks • halters • harnesses • lead ropes • crush • towels • PPE.	Could include: • nets • gloves • carriers • PPE.	Could include: • plastic holding tanks • snake hooks • snake bags • polystyrene boxes • PPE.	Could include: • nets • plastic holding tanks • bags • polystyrene boxes.	Could include: • plastic holding tanks • paintbrushes.
Husbandry equipment	Could include: • enclosures • hutches • tanks • scrapers • brushes • shovels	Could include: • aviaries • cages • enclosures • hoppers • D cups • shavings	Could include: • vivariums • terrariums • thermometers/temp reader • heat lamps • heat mats • UVB lighting	Could include: • tanks • filters • heaters • stones/gravel • shelter • enrichment.	Could include: • plastic holding tanks • terrariums • substrate • shelter • bowls • solid/gel water

	Mammals	Birds	Reptiles and Amphibians	Aquatics	Invertebrates
	• wheelbarrows • buckets • troughs • hay nets/racks • straw • hay • shelter • enrichment • dustpan and brushes • bins • cloths • dishes • water bottles • shavings • bedding.	• sand • straw • hay • bedding • shelter • nest boxes • enrichment.	• UVB meter • hygrometers • water sprayers • dishes • specialist water bowls • shavings • bark • sand • sphagnum moss • shelter • enrichment.		• enrichment.
Training equipment	Could include: • clickers • targets • rewards • cue • marker.	Could include: • clickers • targets • rewards • falconer's hood • gauntlet • jesses • swivel • lure.	Could include: • targets • rewards.		N/A

	Mammals	Birds	Reptiles and Amphibians	Aquatics	Invertebrates
Handling and restraint equipment	Could include: • halters • harnesses • pig boards • lead ropes • crush • baskets • collars and leads • plastic holding tanks • collars and leads • PPE.	Could include: • nets • gloves • carriers • PPE.	Could include: • plastic holding tanks • snake hooks • snake bags • polystyrene boxes • PPE.	Could include: • nets • plastic holding tanks • bags • polystyrene boxes • PPE.	Could include: • plastic holding tanks • paintbrushes • PPE.
Housing equipment	Could include: • animal enclosures • scrapers • brushes • shovels • wheelbarrows • buckets • troughs • hay nets/racks • straw • hay • shelter • enrichment • hutches	Could include: • aviaries • cages • animal pens • hoppers • D cups • shavings • sand • straw • hay • bedding • shelter • nest boxes • enrichment	Could include: • vivariums • terrariums • thermometers/temp reader • heat lamps • heat mats • UVB lighting • UVB meter • hygrometers • water sprayers • dishes • specialist water bowls • shavings	Could include: • tanks • filters • heaters • stones/gravel • shelter • enrichment • cleaning equipment and PPE.	Could include: • plastic holding tanks • terrariums • substrate • shelter • bowls • solid/gel water • enrichment • cleaning equipment and PPE.

	Mammals	Birds	Reptiles and Amphibians	Aquatics	Invertebrates
	• tanks • enclosures • dustpan and brushes • bins • cloths • dishes • water bottles • shavings • bedding • hutches • dustpan and brushes • bins • cloths • dishes • water bottles • shavings • bedding • cleaning equipment and PPE.	• cleaning equipment and PPE.	• bark • sand • sphagnum moss • shelter • enrichment • cleaning equipment and PPE.		

Science equipment	Must include: • basic laboratory set-up and chemicals • Bunsen burners, glassware, safety equipment and Personal Protective Equipment (PPE) • titration sets • gram staining kits and bacterial identification sheets • light microscopes and associated equipment • microbiology set up to include agar plates, incubator, autoclave, antibiotic discs • adequate waste disposal

	Mammals	Birds	Reptiles and Amphibians	Aquatics	Invertebrates
	• PH indicators. May also include: • fume cupboards • mass spectrometer • set of histological sample slides • gel electrophoresis • calorimeters • slide preparation and staining equipment.				

Internal quality assurance

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

Supervision and authentication of candidate work

The Head of Centre is responsible for ensuring that assessment evidence is conducted in accordance with City & Guilds' requirements.

City & Guilds requires:

- candidates to sign the Declaration of authenticity form to confirm that any work submitted is their own
- tutors to confirm on the record form that the work submitted for assessment is solely that of the candidate concerned and was conducted under the conditions laid down in the assessment documentation.

The tutor must be sufficiently aware of the candidate's standard and level of work to make a judgement whether the work submitted is within the expected ability and style of the candidate or whether a further investigation into the authenticity of the work is required.

If the tutor is unable to sign the authentication statement for a particular candidate, then the candidate's work cannot be accepted for assessment.

Learner entry requirements

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

Formal entry requirements are not set by City & Guilds, but it is expected that learners will have qualifications at Level 2 or equivalent. This may include:

- Level 2 vocational qualification or equivalent in a related subject.

3 Delivering the technical qualification

Initial assessment and induction

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

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

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

Programme delivery

The Technical Qualification should be delivered through approaches that meet the needs of learners. City & Guilds recommends using a variety of delivery methods, including in classrooms and real work environments. Learners may benefit from both direct instruction in more formal learning environments and taking part in investigative projects, e-learning and their own study and learning through indirect approaches to delivery.

4 Competency frameworks

The Technical Qualification has been developed to include competency frameworks for T Levels, which demonstrate an array of competencies across maths, English and digital skills as well as four key core skills that have been mapped on to the core content. This can be seen in the skills section for each criterion.

Core skills

In the design, delivery and assessment of the Technical Qualification the following core skills are fundamental in the development of the required knowledge, skills and behaviours that learners will need to use when they progress onwards from completing their T Level. These core skills have been mapped to the design of the qualification content and developed in consultation with the industry and providers. The mapping identifies opportunities where these core skills can be developed and embedded into teaching and learning. It is not expected that all criteria will develop core skills, but where these skills exist in the core content it has been referenced to support centres.

Core Skill A (CSA) Analysing
This may be evidenced through:

- analysis of qualitative and quantitative data and information
- identifying common features
- organising into types
- discerning patterns
- deconstructing
- classifying
- ordering.

Core Skill B (CSB) Communication
This may be evidenced through:

- reading, writing, listening, and speaking through the use of visual, oral, and written methods
- demonstrating active listening
- building a rapport
- engaging an audience
- adapting style and tone to audience needs and nature of the message.

Core Skill C (CSC) Critical thinking
This may be evidenced through:

- problem solving
- decision making
- researching and planning to include questioning
- evaluating pros and con
- using logic and reasoned arguments
- synthesising
- concluding.

Core Skill D (CSD) Decision making
This may be evidenced through:

- clarifying logical choices
- identifying likely impact
- using evidence and advice
- justifying
- substantiating
- concluding.

Core Skill E (CSE) Investigating
This may be evidenced through:

- obtaining information and data including identifying potential sources
- developing search criteria/queries
- interrogating data
- designing and carrying out tests.

Core Skill F (CSF) Working in a team
This may be evidenced through:

- mutual support
- open communication
- respect and honesty
- developing new ideas and interpretations
- providing support
- advice and guidance
- reflecting
- inviting and providing feedback on own and others' performances.

Maths, English and digital skills

Maths, English and digital skills have been mapped across the core content and each of the Occupational Specialisms. The lists below identify the core competencies which can be found in the skills section of each performance criteria.

General English Competencies

The General English Competencies outline a framework of six General English Competences, with no prioritisation or interpretation of order intended:

- EC1. Convey technical information to different audiences
- EC2. Present information and ideas
- EC3. Create texts for different purposes and audiences
- EC4. Summarise information/ideas
- EC5. Synthesise information
- EC6. Take part in/lead discussions.

General Mathematical Competencies

The General Mathematical Competencies outline a framework of ten General Mathematical Competences, with no prioritisation or interpretation of order intended:

- MC1. Measuring with precision
- MC2. Estimating, calculating and error spotting
- MC3. Working with proportion
- MC4. Using rules and formulae
- MC5. Processing data
- MC6. Understanding data and risk
- MC7. Interpreting and representing with mathematical diagrams
- MC8. Communicating using mathematics
- MC9. Costing a project
- MC10. Optimising work processes.

General Digital Competencies

The following outlines a framework of six General Digital Competences, with no prioritisation or interpretation of order intended:

- DC1. Use digital technology and media effectively
- DC2. Design, create and edit documents and digital media
- DC3. Communicate and collaborate
- DC4. Process and analyse numerical data
- DC5. Be safe and responsible online
- DC6. Controlling digital functions.

5 Scheme of assessment

Assessment methods

Learners must complete:

A core exam consisting of **two** externally set exams covering knowledge from the Agriculture, Environmental and Animal Care common core and the following mandatory core pathway:

- Animal Management core pathway
- Animal Science core pathway.

The exams provide sufficient sampling of the content and consist of a mixture of short answer questions (SAQs), some of which will be structured, and extended response questions (ERQs). The balance of questions in assessing across assessment objectives (AOs) 1, 2 and 3 will allow for the appropriate differentiation of learners to support the reliable setting of grade boundaries.

One Employer-set Project:

- Animal Management and Animal Science.

The Employer-set Project will cover knowledge and core skills from the Agriculture, Environmental and Animal Care common core and the mandatory core pathway that has been chosen.

The Employer-set Project will consist of a well-defined, real industry-style brief. The brief will be complex and non-routine, and will require the use of relevant maths, English and digital skills. The brief will provide a valid context for the Level 3 learner to demonstrate their knowledge and understanding of the core content and their core skills to solve occupationally relevant situations and/or problems.

And

One Occupational Specialism from the following:

- Animal Management and Behaviour
- Animal Management and Science.

These will include two or more assessments depending on the Occupational Specialism chosen. These assessments will feature a considerable practical element and are composed of a series of holistic practical tasks relating to the specialism at hand. They will take place over a period of time, scheduled at the provider's preference within an assessment window annually. By nature of the considerable practical elements, some tasks will generate significant ephemeral evidence and be heavily reliant on Internal Assessor observation notes and records for validation.

Grading and marking

The Animal Care and Management core component is graded overall A*–E plus ungraded (U). On completion of the common core exam, core pathway exam and an Employer-set Project.

The Occupational Specialisms are graded overall Distinction, Merit, Pass and Ungraded. Each Occupational Specialism achieved will receive a grade.

Technical Qualification scheme of assessment overview

	Core Component – Learners must complete **the core exam** and **one Employer-set Project**					
Assessment component	**Method**	**Duration**	**Marks**	**Weighting**	**Marking**	**Grading**
Core exam must include the common core (exam paper 1) paper and one core pathway option (exam paper 2)						
8717-030 Common core (Exam paper 1)	Externally set exam	2 hours	80	30%	Externally marked	A* - E
One from the core pathways below						
8717-040 Core pathway (Exam paper 2) Animal Management	Externally set exam	2 hours	80	30%	Externally marked	
8717-041 Core pathway (Exam paper 2) Animal Science	Externally set exam	2 hours	80		Externally marked	
Employer-set Project						
8717-042 Animal Management and Animal Science	Externally set project	17 hours	90	40%	Externally marked	

Occupational Specialism Component – Learners must complete **one** assessment component						
Assessment component	**Method**	**Duration**	**Marks**	**Weighting**	**Marking**	**Grading**
8717-47 Animal Management and Behaviour	8717-407 Externally set assignment – synoptic assignment	29 hours	75	75%	Externally moderated	All Occupational Specialism components will be awarded on the grade scale P, M, D
	8717-408 Externally set assignment – research project	15 hours and 10 minutes	36	25%	Externally marked	
8717-48 Animal Management and Science	8717-409 Externally set assignment – synoptic assignment	29-33 hours	78	40%	Externally moderated	
	8717-410 Externally set assignment – research project	16 hours and 10 minutes	36	25%	Externally marked	
	8717-411 Externally set assignment – science knowledge test	2 hours	80	35%	Externally marked	

Occupational Specialism scaled marks

Scaled marks are used for the Occupational Specialisms in this Technical Qualification so that the assessment component weightings can be achieved. The marks for each assessment component are multiplied by a scaling factor. Scaled marks are then be summed to form the scaled marks for the Occupational Specialism overall. Summed scaled marks are rounded to the nearest integer, with half marks being rounded up.

Animal Management and Behaviour Occupational Specialism			
Assessment component	**Weighting**	**Marks**	**Scaling factor**
Synoptic assignment	75%	75	1.440
Research project	25%	36	1.000

Animal Management and Science Occupational Specialism			
Assessment component	**Weighting**	**Marks**	**Scaling factor**
Synoptic assignment	40%	78	1.174
Research project	25%	36	1.590
Science knowledge test	35%	80	1.002

Core component scheme of assessment

The assessments for this component consist of one core exam consisting of two question papers and an Employer-set Project, which are set against a set of assessment objectives (AOs) used to promote consistency among qualifications of a similar purpose. They are designed to allow judgement of the learner to be made across a number of different categories of performance.

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

AO weightings for the assessment components related to the core components are detailed below.

Core exam

Assessment objective	Description	Assessment objective weightings
AO1a Demonstrate knowledge	The ability to demonstrate basic recall of relevant knowledge in response to straightforward questioning, e.g. material properties. In the exam, this helps to give confidence in sufficiency of coverage of the content, and recognises that not all knowledge requires further understanding e.g. terminology, number facts, etc.	10%
AO1b Demonstrate understanding	The ability to explain principles and concepts beyond recall of definitions, but in a general way – i.e. out of a particular context in response to straightforward questioning e.g. simple concepts and terms of description in agricultural contexts.	15%
AO2 Apply knowledge and understanding to different situations and context	Using and applying knowledge and understanding taking the understanding of generalities and applying them to specific situations. Questions are likely to ask for application in relation to a straightforward situation e.g. assessing the application of a single concept and the application of essential mathematical concepts. It is more granular than the more extended synthesis/creation that may respond to an analysis of a more holistic complex situation/brief.	45%
AO3a Analyse information and issues	Complex thinking that distinguishes patterns and relationships, breaking material into constituent parts, and determining how the parts are related to one another and holistically, inferring underlying assumptions/conditions/relevance/causation.	30%
AO3b Evaluate information and issues	The ability to make judgements about the value, for some purpose, of own or others' work/ideas/solutions/methods using internal or external criteria or standards relevant for the occupational area. These criteria may include e.g. quality, accuracy, effectiveness, efficiency, coherence, consistency, and may be quantitative or qualitative.	

Component	Assessment method	Description and conditions
Core exam	Externally marked test	The test is **externally set and externally marked** and will be sat through question papers provided by City & Guilds. The test is designed to assess learners' depth and breadth of understanding across the core component in the qualification at the end of the period of learning and will be sat under invigilated examination conditions. See JCQ requirements for details: **http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations** The exam will be made up of different question types that include short answer questions, structured questions, and extended response questions. The level of difficulty will increase through the paper with lower demand questions at the beginning of the question paper to higher demand questions at the end of the question paper.

Component	Assessment method	Assessment overview
Core exam Common core Exam paper 1	Externally marked test	Content overview: • Health and safety • Sustainability • Working in the agriculture, environmental and animal care sector • Ethics • Business • Equality • Communication • Relationship management • Finance • Information and data.
Core pathway exam Animal Management Exam paper 2	Externally marked test	Content overview: • Health and safety • Sustainability • Biosecurity • Supply chain • Learning theory • Anatomy and physiology • Animal health.

Core pathway exam Animal Science Exam paper 2	Externally marked test	Content overview: • Health and safety • Sustainability • Biosecurity • Supply chain • Anatomy and physiology • Cells and tissues • Nutrition • Animal behaviour.

Employer-set Project

Assessment objective	Typical evidence	*Approximate weighting
AO1 Plan approach to meeting the brief	Evidence of a planned approach to work, considered sequence of activity, evidence of prioritisation, review, and iterative working. Clearly structured response to brief, cohesive response with ordered sections, logical approach to referencing, research and use of sources, response completed meeting required parameters, sources used effectively and integrated into response, effective use of time allocation available for presentations.	13.3%
AO2 Apply core knowledge and skills as appropriate	Linking knowledge principles and ideas and applying them in context of the brief when considering compiling response use of materials, concepts etc. Applying core skills e.g. communication, planning etc. appropriately throughout tasks within project.	50%
AO3 Select relevant techniques and resources to meet the brief	Selection of techniques and resources in order to support a response to the brief; consideration of the techniques and resources that are most effective and appropriate to use, and accurate and informed use of these.	13.3%
AO4 Use maths, English and digital skills	Use of correct terminology, abbreviations, units of measurement in context, consideration of audience of brief response (technical versus non-technical wording), use of calculations/diagrams etc., appropriately, consideration of the use of ICT and digital methods both in brief response and in evidence presentation.	10%
AO5 Realise project outcome and review how well the outcome meets the brief	Considered analysis and evaluation of project outcome, response conclusion or evaluation, identification of solutions in response to brief problem with evidence of evaluation of other options and reasons for rejection of other options where not appropriate.	13.3%

*Total weightings of AO1, AO3 and AO5 are rounded to the nearest whole number

Component	Assessment method	Description and conditions
Employer-set Project	Externally marked project	This project is **externally set and externally marked** by City & Guilds and is designed to require the learner to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories and knowledge from across the whole of the Agriculture, Environmental and Animal Care core content. Projects will be released to centre staff in advance of any of the assessment windows for each task. City & Guilds will provide centres with assessment windows for centres to timetable assessment sessions within, in accordance with the assessment times prescribed in the Employer-set Project centre guidance. Centres will be required to maintain the security of all live assessment materials until assessment windows are open. Projects will therefore be password-protected and released to centres through a secure method. Guidance on equipment, resources and duration will be released as appropriate to ensure centres can plan for delivery of the project in advance. Learners who fail the Employer-set Project on first submission can retake in any assessment window.

Assessment component	Assessment Method	Assessment overview
Employer-set Project	Externally marked project	**Content overview:** The Employer-set Project samples knowledge drawn from across the core content in relation to the specific project version context. **Assessment overview:** The Employer-set Project is an assessment made up of several tasks that will take place within controlled conditions, assessing the knowledge and skills learned as part of the core element of the T Level. Each project will be developed together with employers in the industry to reflect realistic types of developments, activities and challenges. The project is made up of a number of tasks which all relate to the same Employer-set Project brief: • Research • Report • Plan • Peer review • Evaluate and present. The project draws on the content from the core knowledge and assess the following core skills: • Analysing • Communicating • Critical thinking • Decision making • Investigating • Working in a team.

Scheduling of the Employer-set Project assessments

The Employer-set Project assessment window will occur from March to May annually. Specific dates will be released annually through the key date schedule for the following academic year.

Task	Scheduling	Task duration
1 Research	City & Guilds sets the assessment window for the centre to timetable	6 hours
2 Report	City & Guilds sets the assessment window for the centre to timetable	4 hours
3 Plan	City & Guilds sets the assessment window for the centre to timetable	4 hours
4 Peer review	City & Guilds sets the assessment window for the centre to timetable	1 hour
5 Evaluate and present	City & Guilds sets the assessment window for the centre to timetable	2 hours

A supporting document and guidance will be shared in advance of the assessment to support timetabling and planning for centres, for example outlining any required resources or conditions. This will be released to centres as part of the Key Dates Schedule.

Occupational Specialism component scheme of assessment

What is the Occupational Specialism component?

The Occupational Specialism components are assessed by a range of assessment methods and vary dependent on the pathway, as detailed in the section titled - ***Technical Qualification scheme of assessment overview*.**

The synoptic assignment and research projects consist of a project brief presented as client requirements or a specification of work that is realistic to the Occupational Specialism rather than detailed instructions on what to do, to allow the learner to demonstrate that they have the knowledge required to implement the brief. There will be several high-level tasks in each version of the synoptic assignment and research project, and these will take the form of planning and carrying out industry relevant tasks. Within each high-level task there will be several sub-tasks that learners will need to complete as directed within the assessment documents. The sub-tasks will reflect the project brief for that version of the assignment.

How is the Occupational Specialism component marked?

Synoptic assignments

The Occupational Specialism synoptic assignments will be marked at a task level. Once learner evidence has been generated, internal assessors will make a holistic judgement on performance by applying the knowledge and skills that have been demonstrated to task grade descriptors within the marking grid.

The learner will receive a total mark for each task. The total for each task is accumulated, giving a total mark for the synoptic assignment. Task grade descriptors will be common across every version of the assessment and will assess a similar range of evidence across assessment versions, ensuring comparability of demand between every version of the assessment.

Internal assessors will be directed to specific task evidence that must be used to support judgements on performance against the grade descriptors. The grade descriptors will be broad enough to ensure that all the performance criteria across the specialism are assessed, supporting reliability of the assessment.

Research projects

The Occupational Specialism research projects will be marked at a task level. Once learners have completed all tasks, centres will be required to submit the evidence to City & Guilds for external marking. An external assessor recruited by City & Guilds will make a holistic judgement on performance by applying the knowledge and skills that have been demonstrated through each task and how they reflect against the grade descriptors within the marking grids.

The learner will receive a total mark for each task. The total for each task is accumulated, giving a total mark for the research project. Task grade descriptors will be common across every version of the assessment and will assess a similar range of evidence across assessment versions, ensuring comparability of demand between every version of the assessment.

External assessors will be directed to specific task evidence that must be used to support judgements on performance against the grade descriptors. The grade descriptors will be broad enough to ensure that all the performance criteria across the specialism are assessed, supporting reliability of the assessment.

Science knowledge test (AMS OS only)

The science knowledge test is **externally set and externally marked** and will be sat through a question paper provided by City & Guilds.

The knowledge test is designed to assess learners' depth and breadth of understanding across the Animal Management and Science Occupational Specialism at the end of the period of learning and will be sat under invigilated examination conditions. See JCQ requirements for details: **http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations**

Assessment component	Assessment method	Overview and conditions
Animal Management and Behaviour and Animal Management and Science	Externally set, externally moderated synoptic assignment	This assignment is **externally set, internally marked and externally moderated**, and is designed to require the learner to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories and knowledge from across the occupational area. Assignments will be released to centre staff towards the end of the learners' programme, usually the week before Easter each year. Centres will be required to maintain the security of all live assessment materials until assessment windows are open. Assignments will therefore be password-protected and released to centres through a secure method. Guidance on equipment, resources and duration will be released as appropriate to ensure centres can plan for delivery of practical assignments in advance. Learners who fail the Occupational Specialism following the first submission can retake in any assessment window. Please note that for externally set assignments City & Guilds provides guidance and support to centres on the marking process and associated marking grid in the assessment pack for the qualification, and guidance on the use of marking grids. **Animal Management and Behaviour synoptic assignment overview** Learners will be able to: • optimise health and welfare of animals • optimise animal environments to meet their needs • apply techniques to influence positive animal behaviour. **Animal Management and Science synoptic assignment overview** Learners will be able to: • observe the behaviour, security and breeding practices of animals • plan for and manage the good health and welfare of animals • carry out safe animal handling practices • plan, perform, record and communicate findings of scientific investigations in animal science.

Assessment component	Assessment method	Overview and conditions
Animal Management and Behaviour and Animal Management and Science	Externally set, externally marked research project.	This project is **externally set and externally marked** and is designed to require the learner to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories and knowledge from across the occupational area. The research project will be released to centre staff towards the end of the learners' programme, usually the week before Easter each year. Centres will be required to maintain the security of all live assessment materials until assessment windows are open. Assignments will therefore be password-protected and released to centres through a secure method. Guidance on equipment, resources and duration will be released as appropriate to ensure centres can plan for delivery of practical assignments in advance. Learners who fail the Occupational Specialism following the first submission can retake in any assessment window. Please note that for externally set assignments City & Guilds provides guidance and support to centres on the marking process and associated marking grid in the assessment pack for the qualification, and guidance on the use of marking grids. **Animal Management and Behaviour research project overview** Learners will be able to: • provide information researched on an animal to promote animal welfare and conservation. **Animal Management and Science research project overview** Learners will be able to: • apply research methods to collect and analyse scientific information on animal conservation.
Animal Management and Science	Externally set, externally marked knowledge test	The science knowledge test is **externally set and externally marked** and will be sat through question papers provided by City & Guilds. The test is designed to assess learners' depth and breadth of understanding across science topics within the Occupational Specialism in the qualification at the end of the period of learning and will be sat under invigilated examination conditions. See JCQ requirements for details:

Assessment component	Assessment method	Overview and conditions
		http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations The exam will be made up of different question types that include short answer questions, structured questions and extended response questions. The knowledge test contains three sections for each performance outcome targeted by the assessment. Within each section the level of difficulty will increase with lower demand questions at the beginning of the section to higher demand questions at the end of the section. **Performance outcomes assessed in the science knowledge test:** PO2 Observe the behaviour, security and breeding practices of animals. PO3 Plan for and manage the good health and welfare of animals. PO5 Plan, perform, record and communicate findings of scientific investigations in animal science. **Learners will be assessed against the following assessment objectives:** **AO1a:** Demonstrates knowledge of animal science principles, concepts, theories and methods. **AO1b:** Demonstrates understanding of animal science principles, concepts, theories and methods. **AO2:** Apply knowledge and understanding of animal science principles, concepts, theories and methods: • in theoretical context • in practical context. **AO3:** Analyse and evaluate animal science principles, concepts, theories and methods: • in theoretical context • in practical context.

Availability of assessments

Scheduled assessment windows will be set annually for the T Level Technical Qualification in Animal Care and Management (Level 3). Exact key dates for assessment that are externally marked (core exams and the Employer-set Project) will be communicated to approved providers annually through the key date schedule.

Component	Series	Assessment type	Calendar month/s	Assessment window/set date
Core exam 1	Summer series	Written exam	May/June	Set date
	Autumn series	Written exam	November	Set date
Core exam 2	Summer series	Written exam	May/June	Set date
	Autumn series	Written exam	November	
Employer-set Project	Summer series	Project	March/May	Set dates within assessment window
	Autumn series	Project	October/November	Set dates within assessment window
Occupational Specialism	One series annually	Synoptic assignment Research project Written exam (AMS only)	Please refer to the key date schedule for specific assessment windows for each Occupational Specialism. Set date (Science Knowledge Test)	

6 Technical qualification grading and result reporting

Awarding the technical qualification grade

The technical qualification components are awarded as shown below:

Component	Grading
Core	A* – E
Occupational Specialism	Pass, Merit and Distinction

Core component

Calculating the grade of the core component uses the aggregation of points from across all assessment components in the core to calculate the overall grade for the core component.

Core component grade descriptors

Component	Grade	Descriptor
Core	A	To achieve an 'A' grade a candidate will: Show clear ability to demonstrate a comprehensive understanding of the full range of principles that influence Agriculture, Environmental and Animal Care activities in routine contexts and allow successful implementation to non-routine contexts. Makes detailed and accurate links between relevant knowledge and understanding when responding to briefs/tasks/problems in a logical and methodical format. Legitimate and justified approaches are provided in response to briefs/tasks/problems. There is a meticulous approach in the selection and justification of processes, techniques, solutions, resources and health and safety considerations when planning approaches or responses to briefs or problems. Uses a broad range of communication strategies and an ability to adapt their language, style and format to respond well to audience and stakeholder needs in presenting approaches that are technically accurate to solving problems. Demonstrate a high degree of accuracy in knowledge and skills from across the core content and critically evaluate their own performance in meeting a brief, identifying areas for improvement where appropriate.
Core	E	To achieve an 'E' grade a candidate will:

Component	Grade	Descriptor
		Demonstrate a limited understanding of some of the key principles and how they influence Agriculture, Environmental and Animal Care activities in routine contexts. Makes broader and less thorough links between knowledge and understanding when responding to briefs/tasks/problems. The response can sometimes be superficial, not evidence-based and supported by partial reasoning. Understanding is limited in the selection of processes, techniques, solutions, resources and health and safety considerations to meet the requirements of routine briefs or problems. Demonstrate a small range of communication strategies that are sometimes not suitable in language, style and format for audiences and stakeholders with technical inaccuracies to solving problems. Demonstrates some accuracy in knowledge and skills from across the core content and provides some evaluation of performance and how requirements have been met when addressing a brief, with minimal reference on how to improve.

Occupational Specialism component

Calculation of the grade for the Occupational Specialism is based on setting grade boundaries for Pass and Distinction. The setting of grade boundaries is based on judgemental evidence, against the grade descriptors for the Occupational Specialisms, review of the Guide Standard Exemplification Materials (Grade Standard Exemplification Materials after the first award) and review of statistical evidence.

Pass and Distinction grade descriptors can be found in the centre occupational assessment materials.

To successfully achieve an Occupational Specialism the learner needs to be recognised at threshold competence (Pass).

Threshold competence refers to a level of competence that:

- signifies that a learner 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 learner 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 learner has achieved at least a pass in relation to the relevant Occupational Specialism component.

If a learner does not meet the minimum standards as determined by City & Guilds for either/both the core component and Occupational Specialism they will be issued with an unclassified (U) grade.

Occupational Specialism grade descriptors

Animal Management and Behaviour

To achieve a pass (threshold competence), a candidate will typically be able to:

Demonstrate an adequate level of performance that meets minimum industry requirements, demonstrating sound technical skills and techniques to safely carry out work to an adequate quality standard within time constraints.

Carry out practical tasks applying adequate industry knowledge and understanding of optimising animal health and welfare, the animal's environment, husbandry requirements and behavioural requirements to achieve industry standards of animal management.

Work within relevant animal welfare and health and safety legislation and regulations, identifying potential risks and applying adequate control measures prior to commencing tasks.

Prepare work area to an adequate standard to safely carry out tasks, applying adequate control measures during tasks.

Present information to an adequate standard in appropriate records, such as health assessment records and behavioural observation records.

Apply knowledge and understanding of animal data, records and information to make adequate decisions.

Mostly use technical terminology accurately in plans, reports and documentation.

To achieve a distinction, a candidate will typically be able to:

Demonstrate an excellent level of performance that fully meets industry requirements, demonstrating strong technical skills and techniques to safely carry out work to high quality standards and efficiently within time constraints.

Carry out practical tasks to a high industry standard, applying excellent knowledge and understanding of optimising animal health and welfare, the animal's environment, husbandry requirements and behavioural requirements to achieve excellent industry standards of animal management.

Clearly identify and work within all relevant environmental and health and safety legislation and regulations, taking the initiative to identify and mitigate potential risks prior to commencing tasks.

Display excellent preparation of working area, mitigating potential risks prior to commencing tasks and consistently apply comprehensive control measures during tasks that allow safe and efficient working.

Present detailed, relevant information in appropriate records, such as such as health assessment records and behavioural observation records.

Apply excellent, relevant knowledge and understanding of animal data, records and information to make appropriate decisions.

Consistently use technical terminology accurately in plans, reports and documentation.

Animal Management and Science

To achieve a pass (threshold competence), a candidate will typically be able to:

Demonstrate an adequate level of performance that meets minimum industry requirements, demonstrating sound technical skills and techniques for carrying out routine husbandry tasks associated with breeding and rearing animals to adequate standards and is able to enter the animal science industry to begin work in the occupational area.

Demonstrate an adequate understanding of human-animal interaction, applying safe and welfare orientated techniques when handling animals.

Interpret technical information, plan, assess risk and follow safe working methods appropriately when applying practical skills to an adequate standard to satisfy the requirements of the task.

Work within relevant environmental and health and safety legislation and regulations.

Adequately prepare scientific equipment to safely undertake investigations, applying all needed control measures during tasks.

Adequately prepare working areas to allow safe working, acknowledging potential risks and applying acceptable control measures during tasks.

Mostly use technical terminology accurately in plans, reports and documentation.

To achieve a distinction, a candidate will typically be able to:

Demonstrate an excellent performance that fully meets the requirements of the tasks, demonstrating strong technical skills and techniques for carrying out routine husbandry tasks associated with breeding and rearing animals to consistently high standards and is able to enter the animal science industry to begin work in the occupational area.

Demonstrate an excellent understanding of human-animal interaction, consistently applying safe and welfare orientated techniques when handling animals.

Thoroughly interpret technical information, applying excellent skills to plan, assess risk and follow safe working methods to practical tasks and procedures to a high standard in response to the requirements of the brief and tasks.

Clearly identify and work within all relevant environmental and health and safety legislation and regulations, taking the initiative to identify and mitigate potential risks prior to commencing tasks.

Show excellent preparation of scientific equipment to safely undertake investigations, applying detailed control measures during tasks.

Show excellent preparation of a working area, mitigating potential risks prior to commencing tasks and consistently apply comprehensive control measures during tasks that allow safe and efficient working.

Consistently use technical terminology accurately in plans, reports and documentation.

Awarding the T Level programme grade

To achieve a T Level Technical Qualification in Animal Care and Management (Level 3) a learner must complete all elements of the T Level framework set by the Institute for Apprenticeships and Technical Education (IfATE). This includes the technical Qualification, industry placement and other requirements set, such as a license to practice qualification.

In meeting the above requirements, the learner will be eligible to be awarded an overall qualification grade for the T Level Technical Qualification in Animal Care and Management (Level

3). The calculation of the qualification grade will be based on performance in the core component and Occupational Specialism, as set out below.

Calculation of the T Level Qualification Grade				
	Occupational Specialism grade			
Core component grade		Distinction	Merit	Pass
	A*	Distinction*	Distinction	Merit
	A	Distinction	Distinction	Merit
	B	Distinction	Merit	Merit
	C	Distinction	Merit	Pass
	D	Distinction	Merit	Pass
	E	Merit	Pass	Pass

7 Administration

Factors affecting individual learners

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

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

Malpractice

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

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

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

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

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

Accessibility

In the design of the Technical Qualification and its assessments, the following principles have been applied:

- In the development of content, tasks, and assessments **all** learners are considered
- Well-designed materials that do not create barriers to attainment. This will include content being presented logically and uncluttered
- No particular characteristic or group of learners are disadvantaged by features of a qualification
- Language is appropriate including carrier language which is presented in its simplest for fair access to all learners
- In the design of content and assessments the impact on learners' social, behavioural and emotional well-being will be considered
- Physical and sensory needs of learners in accessing content and assessments are considered.

Access arrangements

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

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

Please refer to the *JCQ access arrangements and reasonable adjustments and Access arrangements – when and how applications need to be made to City & Guilds* for more information. Both are available on the City & Guilds website: **www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library**

In the design of the Technical Qualification and its assessments, the following principles have been applied:

- In the development of content, tasks and assessments, **all** candidates are considered
- Materials are well designed and do not create barriers to attainment. This includes content being presented logically and in an uncluttered way
- No particular characteristics or groups of candidates are disadvantaged by features of the qualification
- Language is appropriate and presented in its simplest form to provide fair access to all candidates
- In the design of content and assessments, the impact on candidates' social, behavioural, and emotional wellbeing is considered
- Physical and sensory needs of candidates in accessing content and assessments are considered.

Special consideration

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

Applications for either access arrangements or special consideration should be submitted to City & Guilds by the Examinations Officer at the centre. For more information, please consult the current version of the JCQ document, *A guide to the special consideration process*. This document is

available on the City & Guilds website: **www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library**

Informing candidate of pre-moderated marks

Centres are required to inform candidates of their marks **before** external moderation. It is important that candidates are informed their pre-moderated marks are provisional and allow sufficient time for them to appeal if felt necessary while still allowing their agreed centre-marked work to be available for external moderation on time.

Centres must also provide candidates with a copy of their marked work and the centre's internal appeals procedures on request.

Internal appeals procedure

For internally marked assessments, all centres must have an internal appeals procedure for candidates, which gives them the opportunity to appeal the centre mark for their work, before moderation takes place. The procedure must ensure:

- the person completing the appeal is competent and did not mark the work originally
- that any marking errors are identified and corrected
- the candidate is informed of the outcome, reason and any change in mark.

The City & Guilds appeals process also covers access arrangements, special consideration and malpractice. Applications are not accepted directly from candidates, but the centre can apply on a candidate's behalf. Where relevant, centres must tell candidates how to request this. The centre can refuse to make the application to City & Guilds, but the candidate must be given the opportunity to appeal this decision. This information must be included in the centre's internal appeals procedure.

Centres must provide candidates and City & Guilds with a copy of their internal appeals procedure, on request.

Results reporting

The Institute for Apprenticeships and Technical Education (IFATE) will certificate Learners who have successfully completed all elements of the T Level Technical Qualification in Agriculture, Environmental and Animal Care: Animal Care and Management (Level 3).

T Level results will be released on the Level 3 results day in August.

Post-results services

The services available include a review of marking and review of moderation. Requests must be submitted within the specified period after the publication of results for individual assessments.

For further details of enquiries about results services, please visit the City & Guilds website at **www.cityandguilds.com**

8 Components

Content of components

The components in this qualification are written in a standard format and comprise the following:

- City & Guilds reference number
- Title
- Level
- Guided learning hours (provisional)
- Assessment method
- Introduction section
- Underpinning knowledge outcome – including range and 'what learners need to learn' sections
- Skills outcomes – including range and 'what learners need to demonstrate' sections
- Links to maths, English and digital skills
- Guidance for delivery
- Suggested learning resources.

300 Agriculture, environmental and animal care common core

Level:	3
GLH:	160
Assessment method:	Externally set exam Employer-set Project

What is this component about?

An introduction to Agriculture, Environmental and Animal Care.

It covers the theoretical knowledge of the Agriculture, Environmental and Animal Care industry that are common across all sectors.

Learners gain an understanding of what theoretical principles and practices integral to the industry and sector are required to work in it.

Learners will develop their knowledge and understanding of:

- working within the agriculture, environmental and animal care sectors and the professional responsibilities, attitudes and behaviours required to do so
- health and safety in the workplace
- business management required within the sector to provide a product or service with success
- project management and delivery of a project.

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

- What are the different sectors in agriculture, environmental and animal care?
- What are the different job roles in agriculture, environmental and animal care?
- What does the future look like for this sector and where could it take me?
- How do I manage and present a project?

Underpinning knowledge outcomes

On completion of the Agriculture, Environmental and Animal Care Core, learners will understand the following from across the sector:

1. Health and safety
2. Sustainability
3. Working in the agriculture, environmental and animal care sector
4. Ethics
5. Business
6. Equality
7. Communication
8. Relationship management
9. Finance
10. Information and data.

Completion of the Agriculture, Environmental and Animal Care Core will give learners the opportunity to develop their maths, English and digital skills. Details are presented in the skills section of each criteria.

Content

1. Health and safety

1.1 Key requirements of **Health and safety legislation**.

Range:
Health and safety legislation – Health and Safety at Work Act 1974, Management of Health and Safety at Work Regulations, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), Lifting Operations and Lifting Equipment Regulations (LOLER), Control of Substances Hazardous to Health Regulations (COSHH), Provision and Use of Work Equipment Regulations (PUWER), Manual Handling Operations Regulations, Fire Safety Act 2021, Personal Protective Equipment (PPE) at Work Regulations, Working Time Regulations, Working Time (Amendment) Regulations, Supply of Machinery (Safety) Regulations, Working at Height Regulations, Control of Noise at Work Regulations.

What do learners need to learn?	**Skills**
Statutory duties of employers, employees and the self-employed, to include: Employers/self-employed: • Provide a safe working environment • Provide safe equipment and systems of work • Provide information, instruction, training and supervision • Arrange for the safe storage, transport and use of articles and substances • Provide adequate welfare facilities for staff • Provide suitable Personal protective equipment (PPE) to all workers (including casual workers) • Take responsibility of the maintenance, storage and replacement of all PPE • Ensure equipment is checked and regularly serviced. Employees/self-employed: • Take reasonable care of their own health and safety • Take reasonable care of other people who may be affected by what they do or do not do at work • Co-operate with their employer on health and safety • Not interfere with or misuse anything provided for their health, safety or welfare • Use provided PPE • Undertake training and instruction as required. Techniques and methods used to comply with legislation and promote health and safety standards – Hierarchy of controls, use of PPE, systems for safe communication with lone workers, training, suitability and maintenance of equipment, signage, appropriate facilities, following RAMS (risk assessment, method statements) recording of relevant health and safety records, safe systems of work, provision of first aiders. Benefits of compliance with health and safety legislation, including protection of workforce and working environment.	CSC, CSD, CSE, CSF, EC6.

Powers of health and safety enforcement officers (inspection, investigation and guidance) and the range of enforcement actions and penalties that may be imposed (prohibition and improvement notices, intervention fee and prosecutions).	

1.2 **Consequences** of poor standards of health and safety practice.

Range:
Consequences – Financial, emotional, reputation, employees, social.

What do learners need to learn?	**Skills**
Direct and indirect consequences of poor standards of workplace health and safety practice on businesses, to include: Financial: • compensation claims • repairs/replacement of equipment • recruitment and retention/retraining of staff • increased insurance premiums • fines by HSE • legal fees. Emotional: • stress. Reputation: • loss of reputation • difficulty in retaining customers • difficulty in attracting new staff • bad publicity. Employees: • reduced staff morale and productivity • increased staff turnover and sickness • physical injuries to staff/ death. Direct and indirect consequences of poor standards of workplace health and safety practice on individuals, to include: Financial: • compensation claims. Emotional: • stress. Reputation: • loss of reputation • bad publicity. Employees: • reduced staff morale and productivity • increased staff turnover and sickness • physical injuries to staff/death. Social: • loss of independence • prison time	CSA, CSC, CSD, CSE, EC4, EC5.

• reduced social activity. Consequences of non-compliance of health and safety legislation, including: • prosecution, imprisonment, fines • legal fees • accidents • disablement • death • loss of income.	

1.3 Purpose of a risk assessment.

What do learners need to learn?	**Skills**
Purpose of a risk assessment – To identify hazards and risks and put appropriate measures in place to mitigate against these, to create a safer, healthier workplace. Typical structures/layout of a risk assessment and definitions of content in a risk assessment. Steps needed to manage risk: • identify hazards • assess the risks (likelihood, severity, number of people affected) • control the risks • record findings • review the controls. How to read and interpret a risk assessment. How they are developed, used and dynamically updated. Implications of poor development and application: • poor working practices • higher risk of accidents resulting in long term consequences • risk of time lost in emergency situation, call out/rescue • financial impact in loss of working time, income, reputation. Hierarchy of control measures: • Elimination – redesign a job or substitute a substance so that the hazard is removed or eliminated • Reduction/substitution – replace a material or process with a less hazardous one • Isolation – do not use pieces of equipment until repaired • Engineering controls – separate the hazard from operators by methods such as enclosing or guarding danger • Administration – identify and implement policies and procedures needed to work safely such as safety/warning signage, training, certification, safe working practices and discipline	CSA, CSB, CSC, CSD, CSE, CSF, EC1, EC2, EC3, EC4, EC5, EC6, DC2, DC3.

• Personal protective equipment (PPE) – where risk cannot be eliminated or sufficiently controlled to a reasonably practicable level using the above measures, use protective equipment to minimise the consequences of the risk.	

2. Sustainability

2.1 Key requirements of environmental **legislation** and key government **policies.**

Range:
Legislation – The Environment Act 2021.
Policies – 25 Year Environmental Plan – GOV.UK.

What do learners need to learn?	**Skills**
Purpose of legislation, associated obligations for businesses, employees and stakeholders in reference to: • improving the natural environment • waste and resource efficiency • improving air quality • improving water quality • enhancing nature and biodiversity • enhancing conservation covenants • regulation of chemicals. Implications of not complying with legislation: • Increased pollution (diffuse pollution) • Environment Agency prosecution. The opportunities and risks that sustainability policies bring to agriculture, environmental and animal care sector: • Opportunities – potential to target new and emerging markets through sustainable practices leading to sustainable branding, potential to utilise waste as a resource increasing profit, potential to expand goods and services into sustainability agenda, potential to develop new products to serve sustainability agenda, potential for taking advantage of government initiatives and funding for environmental services. • Risks – potential of prosecution through non-compliance, potential for additional business costs during product recall, potential loss of custom through reputation damage of non-compliance. The associated environmental performance measures including water and energy use, carbon capture, species targets, water, soil and air quality, mandatory reporting.	CSA, CSC, CSD, CSE, EC4, EC5.

2.2 The concept of sustainable development.

What do learners need to learn?	**Skills**
UK government definition/purpose of sustainable development – Global agreement to eradicate extreme poverty, fight inequality and injustice and leave no one behind. Types of sustainable solutions and improvements to meet development goals including social, environmental, economic and human. • Three pillars of sustainability (social, economic, environmental)	CSA, CSC, CSD, CSE, EC4, EC5.

- How businesses in the sector use the three pillars in action planning to meet sustainability targets.

Awareness of sustainable development goals nationally.

- UK Commitment and Voluntary Review under Agenda 2030.

Sustainable development goals (SDGs) at a macro (national and international) and micro (business) level.

- Macro: SDGs most relevant to the sector (life on land, life below water, health and wellbeing, zero hunger, responsible consumption and production)
- Micro: Business sustainability plans, carbon footprint, commitments to net zero, Corporate Social Responsibility Strategy (CSR).

Concerns and expectations of key stakeholders (social, environmental, economic and human) that include:

- potential loss of competitive advantage
- potential impact economically and socially
- expectations of an international level playing field.

2.3 The **causes**, **impact** and management of climate change.

Range:

Causes – Burning fossil fuels to generate power, manufacturing goods, deforestation, transportation, producing food, powering buildings.

Impact – Environments, displacement of human/wildlife/flora habitation, conservation practices, fauna, sea levels, water levels (flooding), wild-fires, melting ice caps, food security and food safety.

What do learners need to learn?	**Skills**
The meaning of climate change – long term shifts in temperatures and weather patterns. Difference between weather and climate – weather relates to everyday conditions and climate relates to the weather of a particular location for a longer period. Policies and initiatives to manage these changes at national and local level. • 25 Year Environmental Plan • Climate Change Act 2008 • Environmental Improvement Plan 2023 • SDG 13 Climate Action. 10 Point Plan for Green Industrial Revolution (point 2 driving the growth of low carbon hydrogen, point 8 investing in carbon capture, use and storage, point 9 protecting our natural environment).	CSA, CSC, CSD, CSE, EC4, EC5.

3. Working in the agriculture, environmental and animal care sector

3.1 Employment **rights and responsibilities** of the employer and employee.

Range:
Rights and responsibilities – Contracts of employment, anti-discrimination, working hours, rest breaks, holiday entitlements.

What do learners need to learn?	**Skills**
Different types of employment contracts – full time, part time and seasonal contracts agency contracts, self-employed, and the related benefits and limitations to employers and employees. How the rights and responsibilities apply to different employment contracts: Full time and part time: • salary and pro rata salary, hourly paid • hours, rest breaks • overtime, working time directive • statutory rights (minimum wage, holiday, pension, sickness, maternity, paternity and adoption, request flexible hours) • notice periods and redundancy pay. Self-employed: • flexibility and control • adherence to health and safety policies • ownership of profit • liability of losses • absence of statutory entitlements. Agency workers: • conditions of contract • flexibility. Legislation that supports employment rights and responsibilities, including: • Employment Rights Act 1996 • National Minimum Wage Act 1998. Expectations of professional conduct and behaviours in the workplace: • punctuality • cleanliness • conduct • adherence to regulations • respect for own and others work and work area • respect for positions of employment • respect for the land, air, water (environment) • respect for property and belongings of others and animals, including for volunteers). How these expectations are met and demonstrated by employees: • induction outlining expectations • meeting job specification • meeting contract terms • adhering to company policies.	CSB, CSC, CSD, CSE, CSF, EC4, EC5, EC6.

Typical activities that can lead to disciplinary and grievance procedures: • failure to adhere to systems • failure to adhere to health and safety protocols • intimidating behaviour, aggression, use of foul language • harassment and bullying. Role of supervisor/manager, typical disciplinary or grievance procedures. How employers support health and wellbeing of employees: • sick pay entitlement (including agricultural sick pay) • support for attending medical appointments • promotion of health and wellbeing • promotion of social interaction. Importance of monitoring staff and colleagues for signs of slavery and people trafficking and signs of exploitation including loss of rights, for example, under Working Time Directive waivers. • Raise awareness of modern slavery in sector • Monitor workforce including agency staff • Publicise Duty to Notify • Monitor supply chains (social value in procurement). Impact of union membership on the employer and the employee. • Basic protections against being penalised for being, or not being, member of a trade union • Role of trade union representatives (advocacy, agency, representation).	

3.2 Effective teamwork.

What do learners need to learn?	**Skills**
Types of team (formal, informal, small, large, project, task groups, matrix, remote working). How teams are developed, including the role of the team leader: • forming • storming • norming • performing • adjourning. Importance of team dynamics and behaviour and their effect on team performance: • fair allocation of workload • effective communication • clear roles and responsibilities • accountability and ownership of all team members. Qualities of effective team members and team leaders and how these qualities are demonstrated: • defined goals • clear leadership	CSA, CSB, CSC, CSD, CSE, CSF, MC8, EC4, EC5, EC6, DC3.

- assigned roles
- open communication
- collaboration
- trust
- conflict resolution.

Importance of teamwork and how this impacts the team and project performance that includes:

- increased productivity
- increased moral
- promotes creativity
- brings together diverse skills to solve complex problems.

Techniques used by a manager/team leader to monitor and manage individual and team performance and when they should be applied:

- individual and organisational goals
- objective setting
- SMART – set measurable goals
- use of KPIs
- performance management reviews – rewarding positive performance
- providing constructive feedback within individual and team meetings
- managing conflict including mediation.

3.3 Purpose of Continuous Professional Development (CPD) opportunities.

What do learners need to learn?

The benefits CPD brings to the individual and their employer:

- increase career opportunities
- increase job/career satisfaction
- improve work life balance
- career progression/talent development/skilled workforce
- improved confidence/motivation
- staff performance leading to employer performance
- staff retention.

Benefits of keeping up to date technically and legally (employee and employer):

- Advantages of specialisation:
  - achieve higher salary
  - access niche markets
  - reduce costs of external consultancy/contractors
- Role of training in certificates of competence (legal requirement).

Methods of personal and professional development:

- coaching and mentoring
- volunteering
- appraisals
- independent research
- education and training courses
- industry.

Skills

CSB, CSC, CSD, CSE, CSF, MC9, MC10, EC4, EC5, EC6, DC3.

Internal and external sources that can provide this type of support professional bodies and their suitability for achieving identified development needs: • awarding organisations • trade organisations • membership organisations • training providers • employer • colleagues • peers.	

4. Ethics

4.1 **Ethical principles** and **values.**

Range:
Ethical principles – Honesty, transparency, justice, consent, privacy, confidentiality.
Values – Democracy, rule of law, individual liberty, respect and tolerance.

What do learners need to learn?	**Skills**
Definition of a moral and ethics: • Moral is being concerned with the principles of right and wrong behaviour • Ethics are principles that governs a person's behaviour or the conducting of an activity. Definition of the ethical principles and how they are applied in the workplace: • Honesty – to be clear, open and truthful in all forms of communication • Transparency – providing detailed and accurate information to all employees/stakeholders • Justice – prioritise a policy that encourages and rewards diversity and inclusion. Establish policies and procedures against workplace harassment and abuse • Consent – an individual's agreement to allow a certain action to take place, a background check, disclosing of information • Privacy – the various ways of accessing, controlling, monitoring and protecting an individual's information and data • Confidentiality – information about an individual shouldn't be shared without permission of the individual. Definition and purpose of whistleblowing – to eradicate unethical behaviour in the workplace. How ethical principles and values are used: • codes of conduct • employment terms and conditions • workplace policies • supply chains. How ethical principles and values are represented by ethical behaviours and incorporated into business ethics using codes of conduct. What ethical principles and values impact on business operations, including interaction with stakeholders and the supply chain: • sharing of the same ethical values • non exploitation of workers/employees • non-discriminatory against personal characteristics • complying with relevant legislation.	CSA, CSB, CSC, CSE, CSF, EC1, EC4, EC5, EC6, DC3, DC4, DC6.

5. Business

5.1 **Types** of business organisations.

Range:
Types – Sole trader, partnership, limited/unlimited company, state.

What do learners need to learn?	**Skills**
Advantages and disadvantages of types of business organisations: Sole trader advantages: • Simple to set up • Low level of administration responsibility. Your only requirement is to submit a self-assessment tax return • No registration fees • Keep all business profits (after tax deductions). Sole trader disadvantages: • Held personally liable for business losses, debts and negligence as the business is viewed as one entity • Increased personal risk. Partnership advantages: • Easy to set up • There can be more than one business owner for support running the business. Partnership disadvantages: • Increased liability on all parties. Each partner is held liable for any business or individual partners' negligence. Limited company advantages: • Provided with limited liability, only liable for what you have invested into the company • Registering business on Companies House appears more legitimate to customers and stakeholders • Paying corporation tax can be more tax efficient than paying income tax in the higher tax bracket. Limited company disadvantages: • Fees involved to register business • Increased administration responsibility that is likely to warrant the support of an accountant. State business advantages: • Enables policy to be implemented, measured and monitored • Financially backed through government funding • Enables larger infrastructure projects and investment. State business disadvantages: • Size and complexity in delivering on some policy targets. Structures of business – not for profit/charity, freelance, franchise, social enterprise, public sector, private sector.	CSA, CSC, CSD, CSE, MC5, MC6, EC4, EC5, DC4.

Types of objectives and values associated with different types of business and structures including: • key performance indicators • social responsibility objectives • environmental objectives. Financial, legal and commercial implications for each type of business. Typical organisational policies (health and safety, equality) and their relationship to legislation. • health and safety (Health and Safety at Work Act 1974) • procurement (Environment Act 2021) • recruitment (Equality Act 2010).	

5.2 The **principles** of enterprise skills.

Range:
Principles – Risk taking, innovation, resilience, problem solving, strategic development, market analysis, commercial awareness, decision making, prioritisation.

What do learners need to learn?	**Skills**
How the principles are applied to develop business growth and change including sales opportunities and diversification of the business. • Market analysis to support prioritisation – buying patterns, market trends, competitor offers • Potential horizontal or vertical diversification opportunities, risks and rewards • Decision making tools including SWOT analysis and decision trees. Types of business risk (financial, reputational, compliance, operational, economical, security and fraud). Risk management methods and controls (insurance, diversification, risk register, strategic planning, external advice and guidance) that can be deployed.	CSA, CSC, CSD, CSE, MC5, MC6, MC7, MC8, MC10, EC4, EC5, DC4.

5.3 **Measures** that businesses use to determine success.

Range:
Measures – Key Performance Indicators (KPIs), contract terms, Service Level Agreements (SLAs), benchmarking, supply chain requirements.

What do learners need to learn?	**Skills**
Definitions of measures and how these are applied to determine success. Key Performance Indicators (KPIs) – income, revenue, productivity and customer satisfaction. Benefits of KPIs – helps business to focus on priorities, benchmarking,	CSA, CSC, CSD, CSE, MC5, MC6, MC7, MC9, MC10, EC4, EC5, DC4.

monitoring productivity, and motivation of staff. Typical data sets used to interpret and determine if success measures are met to support business and future budget planning: • Enquiries indicating potential for creating sales • Marketing/promotional activity engagement indicating potential in widening customer base and increasing sales (physical events, online activity) • Income, and income against predicted forecast indicating the success of the product or service and future opportunities • Quantitative data using survey results or customer feedback indicating the success/introduction of new products or service and potential repeat custom • Repeat custom indicating the potential sustainability and viability of the business through predicted future sales. Importance of ISO9000 quality standard its purpose and application to organisations. Quality standards expected by internal and external stakeholders and associates. • Service level agreements or contract terms and conditions • Consequences of not meeting quality standards (potential loss of income, potential reputation risk).	

5.4 The **principles** of project management.

Range:
Principles – Timescales, supply chain, people management, resources, budgeting, effective planning.

What do learners need to learn?	**Skills**
How to apply the principles of project management through the implementation of a project plan. Factors to consider in the implementation of a project plan: • purpose and scope of the project • setting clear goals and objectives (SMART technique) • defining roles and responsibilities • setting realistic milestones and constraints on cost and time.	CSA, CSB, CSC, CSD, CSE, CSF, MC1, MC2, MC4, MC5, MC6, MC7, MC8, MC9, MC10, EC1, EC2, EC3, EC4, EC5, EC6, DC3, DC4.

6. Equality

6.1 **Characteristics** protected by equality legislation.

Range:
Characteristics – Age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion/belief (including lack of belief), sex, sexual orientation.

What do learners need to learn?	Skills
The purpose of current equality and diversity legislation and the protected characteristics detailed under the Equality Act 2010, Employment Rights Act 1996, Human Rights Act 1998 and trade unions, including its application in the workplace.	CSA, CSC, CSE, EC4, EC5.

6.2 **Factors** to consider when working with people from diverse backgrounds.

Range:
Factors – Equality legislation, cultural differences, religious needs, beliefs, disabilities, lifestyle, interests, behaviours, personal characteristics, age, gender, educational level, socio-economic status.

What do learners need to learn?	Skills
Define the below behaviours and how they apply in the workplace: • Prejudice – a preconceived opinion that is not based on actual experience • Bias – the act of unfairly defending or opposing a particular person or object based on judgement that is based on personal opinion • Direct discrimination – treated unfairly because of a protected characteristic • Indirect discrimination – can happen when there are rules or arrangements that apply to a group of employees or job applicants, but in practice are less fair to a certain protected characteristic • Harassment – aggressive pressure or intimidation • Victimisation – the action of singling someone out. Consideration of factors when working with people form diverse backgrounds. Potential consequences of negative discrimination (grievance, disciplinary, potential legal action). How to show empathy and respect to those from different backgrounds: • importance of communication • risks of assumptions (stereotyping). Methods that embrace and promote diversity and inclusion including: • inclusive culture – curious and respectful of differences in identity, skills, experiences and perspectives • recruitment – equal opportunity to access job roles and progression opportunities and adopting inclusive hiring practices	CSA, CSB, CSC, CSD, CSE, CSF, EC1, EC4, EC5, EC6, DC3, DC5.

- products – reviewing products to ensure they are accessible, representative and inclusive.

7. Communication

7.1 Types of effective **communication**.

Range:
Communication – Verbal, non-verbal, visual, written.

What do learners need to learn?	Skills
Different types of communication and their suitability for different purposes: • informal • formal. Formats used for the types of formal and informal communication and their associated business conventions (how they are used): • reports • emails • letters • websites • social media • printed media • photographs and video clips • team meetings and individual meetings • face-to-face associated events. Importance of communication, spoken language, body language and tone, and how each is used to convey messages to different audiences for different purposes including: • promotion of the sector/product through social media • legal records • technical reports for quality standards. Use of relevant images and visual aids and how these support written text and oral presentations. Benefits and limitations of social media including risk of misuse, positive and negative effects on the business. Positive effects: • maintain and develop new relationships • share and enhance knowledge • promotes a business. Negative effects: • potential for negative publicity • unclear cost: benefit analysis for time invested.	CSB, CSE, CSF, MC7, MC8, EC1, EC2, EC3, EC4, EC5, EC6, DC1, DC2, DC3, DC5.

8. Relationship management

8.1 Role and purpose of customer care.

What do learners need to learn?	Skills
Importance of first impressions and accurate knowledge when representing the business and self and supporting customers. Difference between customer care and customer service and their wants and needs. Customer care goes beyond customer service because it focuses on emotional connections between brands, products and customers. Customer service focuses on providing advice to customers about the product or dealing with complaints. Methods and impacts of customer care and how they can be applied and maintained when interacting with different stakeholders, including internal customers (volunteers, employees). This includes: • be available to customers and help when you can – helps customers feel more engaged with and increases customer loyalty • personalise customer service – makes the customer feel more valued • friendly/approachable/inclusive attitude – customers feel more comfortable when interacting with products or services. How to manage customer expectations and expected timescales. Benefits of customer care to the individual (increased motivation, positive feedback) and business (customer loyalty, customer confidence, increased revenue). Current legal requirements (Consumer Protection Act 1987, Consumer Rights Act 2015) when interacting with different types of customers and customer relationships including business to business (B2B). Principles of customer service and how it can be maintained: • establish customer needs/expectations • promotion of self, company, goods and services • fulfilling customer needs and expectations • complaints handling (dealing with complaints in a positive manner) and how they are applied to customers. Typical procedures used to deal with customer queries, disputes and complaints, including: • responding • replacement/reservicing • escalation to relevant individuals and departments within organisations to review the effectiveness of processes and procedures. Consequences of not following procedures: • reduction in customer confidence in both product and the retailer • repeat errors that can lead to reputational damage	CSA, CSB, CSC, CSD, CSE, CSF, MC5, MC8, MC10, EC1, EC2, EC3, EC4, EC5, EC6, DC1, DC2, DC3, DC4, DC5.

• if procedures are not followed it may mean that the process is ineffective/not working. Processes used to promote customer relations and to establish and monitor customer satisfaction: • customer feedback • customer satisfaction surveys • customer follow-up procedures • customer visits.	

8.2 Roles of different **stakeholders**.

Range:
Stakeholders – Owners, employees, customers, suppliers, contractors, investors, creditors, media, communities, trade unions, government agencies, associations.

What do learners need to learn?	**Skills**
Definitions/roles, expectations and interrelationships of stakeholders (internal and external). Impact of different stakeholders on the business: • owners • employees – work for the business • customers – purchase product/service from the business and can drive change • suppliers – supply inputs and represent a risk to the business • contractors – supply services and represent a risk to the business • investors – key influencers, drive change • creditors – key influencers, drive change • media – key influencers, drive change in customer behaviour and reputation • communities – social impact of the business • trade unions – key influencers, support the business/sector • government agencies – key influencers, drivers of change • associations – represent and support the business and sector.	CSA, CSC, CSE, EC4, EC5.

9. Finance

9.1 The principles of finance.

What do learners need to learn?	Skills
Definition of profit (including net and gross) and loss, non-profit and cashflow and the significance of each to business. How profit (including net and gross) and loss are calculated, including gross profit margin. Using the components of a profit and loss statement to calculate profit (including net, gross and gross profit margin). Key components of a profit and loss statement: • Revenue • Sales • Inputs/Cost of goods sold • Expenses • Returns, discounts, refunds • Taxation. Types of cost incurred by business (products, ancillary products, types of overheads, labour), their classifications (direct, indirect, fixed, variable). Measures to maximise revenue including adjustments to cost and implications to profitability, reputation and quality. Types of taxation (payroll, business, self-assessment, PAYE, VAT). Sector rates of VAT (standard, reduced, zero). Food and drink, animals, animal feed, plants and seeds. Awareness of Making Tax Digital (MTD). How costs and revenue are forecast. Types of finance (loans, grants/bursaries, income) and the difference between them. • Loans (banks, financiers) and interest rates requires repayment of the money • Governmental grant schemes that don't require repayment of the money. Income: • direct sales • contracts • services.	CSA, CSB, CSC, CSD, CSE, MC1, MC2, MC4, MC5, MC6, MC7, MC8, MC9, MC10, EC1, EC2, EC3, EC4, EC5, DC2, DC3, DC4.

10. Information and data

10.1 Key requirements of legislation relating to the security of information and data.

What do learners need to learn?	Skills
Types of information and data protected by legislation including personal data, client data, intellectual property. How businesses manage information and data and why these methods are used including: • staff training – to support and improve employees' understanding, consistently follow and stay up to date with current policies including General Data Protection Regulation (GDPR) and procedures in handling data to protect personal and business information from the latest threats from hackers • version control – current versions are used to ensure accuracy of information and legislation • access controls – limiting the number of people that need access to sensitive data to mitigate against data breaches • indexing – allows information and data to be found easily in a timely manner • cyber security – software to protect data from illegal access (hacking). Rights of individuals regarding their own information and data. Data storage requirements in relation to security and protection and how they help to prevent common threats including: • cyberattacks • phishing • malware • trojans. How to respond to security breaches: • review of policies and procedures including changing and updating passwords • update fire walls and anti-virus protection • staff training to recognise threats • reporting to the Data Protection Authority (DPA) and individuals who data has been breached. Purpose of current legislation – Data Protection Act 2018, General Data Protection Regulation (GDPR) and organisational procedures that are used to manage data and increase confidentiality: • Support organisations with their lawful processing of personal data • Protect the personalised data of individuals • Regulate how organisations process individual data • Prevent organisations form sharing/selling individual data without permission. Data protection principles – information must be:	CSA, CSC, CSD, CSE, MC2, MC5, MC6, EC1, EC3, EC4, EC5, DC1, DC3, DC4, DC5, DC6.

- used fairly, lawfully and transparently
- used for specified, explicit purposes
- used in a way that is adequate, relevant and limited to only what is necessary
- accurate and, where necessary, kept up to date
- kept for no longer than is necessary
- handled in a way that ensures appropriate security, including protection against unlawful or unauthorised processing, access, loss, destruction or damage.

Guidance for delivery

The Common Core content should be delivered in the context of the Agriculture, Environmental and Animal Care sectors. A variety of active teaching and learning activities should be used to engage learners in this common core. Opportunities for visits/engagement with local industry and employers should be provided throughout the delivery of the content – where appropriate, local employers could present details of recent projects, problems faced and how they were overcome. Learners' work placement experiences could be presented to peers detailing where knowledge and skills within the content was seen in practice.

Formative assessment for the content may include verbal Q&A, presentations to peers, observation of stock control activities, etc. Reinforcement of learning can be encouraged through revisiting learning, group discussions and the establishment of a peer support system within the cohort.

Providers must ensure content is delivered in line with current, up-to-date industry practices which will require:

- current industry legislation, regulations and technical information
- teaching coverage representing the type of equipment currently available and accepted for use in the UK industry.

Suggested learning resources

Websites

- HSE **http://www.hse.gov.uk**
- UN Sustainable Goals **http://www.undp.org/sustainable-development-goals**
- Types of businesses **http://www.bbc.co.uk/bitesize/guides/zqbqgdm/revision/9**
- Natural England **http://www.gov.uk/government/organisations/natural-england**
- UK legislation – **www.legislation.gov.uk**
- Green Alliance – **https://green-alliance.org.uk**
- National Association for Environmental Education – **https://naee.org.uk**
- Energy Saving Trust – **https://energysavingtrust.org.uk**
- Friends of the Earth – **https://friendsoftheearth.uk**
- British Ecological Society – **www.britishecologicalsociety.org**
- Ethical Consumer – **www.ethicalconsumer.org**
- The Wildlife Trusts – **www.wildlifetrusts.org/**
- TreeHugger – **www.treehugger.com/**
- Health and Safety Case in Forestry and Arboriculture: Case studies (hse.gov.uk) – **www.hse.gov.uk/treework/resources/casestudies.htm**
- Personal protective equipment (PPE) at work regulations from 6 April 2022 (hse.gov.uk) – **www.hse.gov.uk/ppe/ppe-regulations-2022.htm#employers-both**
- What Is Climate Change? | United Nations – **www.un.org/en/climatechange/what-is-climate-change**
- Causes and Effects of Climate Change | United Nations – **www.un.org/en/climatechange/science/causes-effects-climate-change**
- Joining a trade union: Trade union membership: your employment rights - GOV.UK (www.gov.uk) – **www.gov.uk/join-trade-union/trade-union-membership-your-employment-rights**
- Whistleblowing for employees: What is a whistleblower – GOV.UK (www.gov.uk) – **www.gov.uk/whistleblowing**

305 Animal Management Core Pathway

Level:	3
GLH:	210
Assessment method:	Externally set exam Employer-set Project

What is this component about?

An introduction to Animal Management and Behaviour.

It covers the theoretical knowledge of animal management sectors and various disciplines that are indicative of the industries.

Learners gain an understanding of what theoretical principles and practices, integral to the industry and sector, are required to work in it.

Learners will develop their knowledge and understanding of:

- fundamental health and safety principles
- principles of biosecurity
- anatomy and physiology
- animal health and techniques used to administer medication
- learning theories and animal health.

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

- What are the different sectors in animal management?
- What are the different job roles in animal management?
- What does the future look like for this sector and where could it take me?

Underpinning knowledge outcomes

On completion of the Animal Management Core Pathway, learners will understand:

1. Health and safety
2. Sustainability
3. Biosecurity
4. Supply chain
5. Learning theories
6. Anatomy and physiology
7. Animal health.

Completion of the Animal Management Core Pathway will give learners the opportunity to develop their maths, English and digital skills. Details are presented in the skills section of each criteria.

Content

1 Health and safety

1.1 **Hazards**, **risks** and **control measures** associated with working in the animal management sector.

Range:

Hazards – Lone working, hazardous materials, equipment, uneven ground, inclement weather, chemicals, other people, movement of animals, unpredictable animal behaviour, handling of animals, poisonous plants, working at heights, radiation, anaesthetic gases, zoonotic disease, biohazards, contact with machinery and equipment.

Risks – Zoonoses, crushing, kicking, biting, contamination or asphyxiation by hazardous materials, slips, trips and falls, drowning, allergens (animal, environmental).

Control measures – Agreed contact times, carrying mobile phone/radio, risk assessments, awareness of location of work, awareness of expected time of return, biosecurity, vaccinations, Personal Protective Equipment (PPE), animal isolation, appropriate handling and restraint techniques and equipment, personal hygiene, safe means of access, working schedules, training, lone working policy, employee health and welfare policy, occupational health.

What do learners need to learn?	**Skills**
Lone working responsibilities for employee and employer under – Health and Safety at Work Act 1974. Management of Health and Safety at Work Regulations 1999 –company policy, communication requirements, risk assessment requirements. How legislation and regulation impact safe working: • Health and Safety at Work Act 1974 • Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) • Equality Act 2010 • Provisions and Use of Work Equipment Regulations 1998 (PUWER) • Waste from Electrical and Electronic Equipment, Personal protective equipment at Work Regulations 1992 (amended 2002) • Control of Substances Hazardous to Health Regulations (COSHH) • The Manual Handling Operations Regulations 1992 • Health and Safety (First Aid) Regulations 1981 • Electricity at Work Regulations 1989 • Regulatory Reforms (Fire Safety) (England) Order 2005 • Control of Waste Regulations (England and Wales) 2012 • Environmental Protection Act 1990 • Smoke Free (Premises and Enforcement) Regulations 2006 • Health and Safety (Safety Signs and Signals) Regulations 1996. Hazards and associated risks to humans when optimising: • the health and welfare of animals • the animal environments. The different associated risks when dealing with a variety of species (large zoo mammals, large birds of prey, venomous animals, dangerous dogs, category 1 species, farm animals).	CSB, CSA, CSC, CSD, CSF, EC1, EC2, EC3, EC5, EC6, MC5, MC6, DC1, DC2, DC3

Associated risks when working with high-risk animals (domestic animals, feral animals, wild animals, wild captive animals) and high-risk situations (direct contact).

The purpose for putting in place control measures and precautions to manage and minimise risks.

The types and purpose of appropriate standard PPE used:

- eye protection
- masks (disposable/respirator/specialist respiratory)
- barrier cream
- gloves (disposable/gauntlets/working)
- aprons
- overalls
- appropriate footwear
- ear defenders
- protective head gear.

The importance of ongoing dynamic risk assessment in different animal environments which may be impacted by:

- indoor and outdoor
- field work
- weather conditions
- interactions with the public
- environmental considerations (contamination).

Risks associated with control measures.

Hierarchy of control measures that can be put in place to minimise risks:

- Elimination – redesign a job so that the hazard is removed or eliminated.
- Substitution – replace a material or process with a less hazardous one such as use of different equipment/machinery.
- Engineering controls – separate the hazard from operators by methods such as enclosing or guarding dangerous items of machinery/equipment, directing moving machinery/vehicles, marked walkways, designated work areas.
- Administrative controls – identify and implement policies and procedures needed to work safely such as safety/warning signage, training, certification, safe working practices and discipline, first aid provision, environmental protection provision.
- Personal Protective Equipment (PPE) – where risk cannot be eliminated or sufficiently controlled to a reasonably practicable level using the above measures, use protective equipment to minimise the consequences of the risk.

1.2 Procedures and contingency and emergency **plans** to follow when dealing with **emergency situations** in the animal management sector.

Range:
Plans – Personnel, welfare of animals, environment.
Emergency situations – Fire, medical, animal escape, animal injury, animal attack, unauthorised public access, power cut, natural disaster, extreme weather (drought, flooding, wind, snow) disease outbreak, contact with electricity, gas leak, water supply (lack of and/or contamination), activist activity, lack of staff, vehicles, tools, machinery or equipment failure, accidents in remote/restricted access locations.

What do learners need to learn?	**Skills**
How the following legislation and regulation impacts emergency planning: • Health and Safety at Work Act 1974 • Control of Substances Hazardous to Health (COSHH) 2002 • Reporting of Injuries Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013 • Zoonoses Order 1989 • Regulatory Reform (Fire Safety) Order 2005 • Movement of Animals (England) Order 2006 • Firearms Act 1968 • Zoo Licensing Act 1981. Emergency situations that can lead to health and safety risks and the associated control measures that should be applied. Correct procedures to follow when encountering an accident, incident or medical emergency including communication, ensuring safety of self and others, including the delegation of roles in an emergency following an emergency action plan. The importance of having appropriate contingency and emergency plans and the consequences (harm/injury, animal welfare, prosecution, reputation, staff moral) to the business, animals and individuals if these plans are not in place. The requirements of staff training (animal and human first aid, fire safety). Which organisations need to be notified in an emergency situation: Department for Environment, Food and Rural Affairs (DEFRA), Animal and Plant Health Agency (APHA), Health and Safety Executive (HSE). What is considered a danger to the public and the services to be notified: emergency services, local authorities, power companies, HSE. How the emergency situations may differ in a range of animal providers: • boarding establishments • vet practices • pet shops • wildlife/farm parks • sanctuaries/rescue/rehabilitation centres • private collections • breeders • aquarium • zoos	CSA, CSB, CSC, CSD, CSE, CSF, EC1, EC2, EC3, EC4, EC5, EC6, MC5, DC1, DC2, DC3

• grooming establishments • pet sitters. The importance of accident and incident reporting in accordance with the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013. The implications of non-compliance of RIDDOR and with HSE to the individual and to the business (prosecution, reputation, staff moral).	

1.3 Principles of safe manual handling and their application when working in the animal management sector.

What do learners need to learn?	**Skills**
How the following legislation and regulation impacts manual handling: • Health and Safety at Work Act 1974 • The Manual Handling Operations Regulations 1992 • Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR). Why legislation and regulation are important for employer and employee safety. How the legislation and regulation would apply to the employer and employee in a work environment. Roles and responsibilities for the employer and employee in relation to the legislation. Consequences of not following the legislation and regulation (prosecution, health and safety order, possible fines, personal injury, claims against the company). Key principles of safe lifting techniques including the use of lifting and moving aids and the HSE directive – five factors: 1. task 2. load 3. working environment 4. individual capability 5. other factors (movement, posture, hinderance by clothing, PPE or machinery). Importance of considering individual capability when manually lifting objects. Importance of considering the size and shape of the objects. When to summon assistance to move objects/loads, including machinery (with reference to the five factors).	CSA, CSB, CSC, CSD, CSE, CSF, EC1, EC2, EC3, EC4, EC5, EC6, MC1, MC2, MC3, DC1

2 Sustainability

2.1 **Waste** management **principles** in the animal management sector.

Range:

Waste – Consumable, non-consumable, commercial, domestic, laboratory, pharmaceutical, infectious clinical, non-infectious clinical, organic, inorganic, recyclable, non-recyclable, hazardous, biohazardous.

Principles – The five Rs of waste management – refuse, reduce, reuse, repurpose, recycle.

What do learners need to learn?	**Skills**
The key requirements of legislation and regulation that affect waste management: • Controlled waste (England and Wales) Regulations 2012 • Nitrate Vulnerable Zones (NVZ) EC Directive • Environmental Protection Act 1990 • Environment Agency rules and associated derogations • The Animal By-Products (Enforcement) (England) Regulations 2013 • The Waste (England and Wales) Regulations 2011 • Clean Air Act 1993. Identification of the different classifications of waste products and how they are managed and processed by licenced carriers. Types of waste that require specific actions, what those actions are and why: • controlled • hazardous • animal (dog hair, feathers, fur) • clinical • offensive (faeces) • biohazard. The purpose and benefits of waste management plans for animal environments, including financial implications of ineffective waste management. Consequences of non-compliance with legal and regulatory requirements when managing waste (financial implications, prosecution, public reputation, environmental impact).	CSA, CSB, CSC, CSD, CSE, CSF, EC4, EC5, MC5, MC6, MC10, DC4

3 Biosecurity

3.1 Biosecurity **control measures** in the animal management sector to prevent the spread of disease.

Range:
Control measures – Staff and visitors' limitation, buildings equipment and vehicles cleanliness/usage protocols, animal management, control of parasites, pests and vermin, inspection, monitoring, regulation, passports, border controls, (including illegal trade) quarantine, isolation, cleaning protocols, food storage, water cleanliness, PPE, exclusion zones, physical barriers, barrier nursing, testing and inoculation, vaccination, elimination of vectors.

What do learners need to learn?	**Skills**
The requirements of biosecurity under: • Animal Welfare Act 2006 • Control of Substances Hazardous to Health (COSHH) 2002 • Zoonoses Order (Amendment) (England) 2021 • Animal Health Act 2002 • Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The purpose of biosecurity in the animal management sector: • prevent/control disease spread • prevent/control the introduction of a new disease • maintain animal welfare • maintain human health • maintain species. Codes of practice under Department for Environment, Food and Rural Affairs (DEFRA) Animal and Plant Health Agency (APHA) in relation to biosecurity: • standards and organisational policies applied to maintenance of working environment • implications of not following the codes of practice. How the following factors influence biosecurity: • national/international trade • new technologies • disease outbreak • disease control • outbreak management implications • border control • quarantine • illegal pet trade • smuggling. Definitions of endemic, pandemic, epidemic, exotic in relation to disease and how they may influence biosecurity. Zoonotic and notifiable disease:	CSA, CSB, CSC, CSD, CSF, EC1, EC4, EC5, MC1, MC2, MC3, MC4, MC5, DC4

- definition of zoonotic, anthroponotic and notifiable
- role of APHA and DEFRA
- movement and restriction zones for notifiable disease (immediate, surveillance zones).

The control measures to prevent the spread of disease.

Implications of the lack of biosecurity:

- risk to wider community
- reduction in performance
- reduction in business
- reputational damage
- negative publicity
- effects on staff illness, wellbeing and performance
- loss of stock
- animal welfare
- environmental
- economy.

Biosecurity risk factors in different types of animal management situations:

- Environmental:
  - humidity
  - ventilation
  - temperature
  - construction materials
  - resources
  - wildlife
  - drainage/organic pollution.
- Animal health:
  - carrier status – disease incubation period
  - vaccination status
  - stocking density
  - vector control methods.
- Husbandry:
  - food/water provision (contamination)
  - hygiene (people including PPE, animals, accommodation).

4 Supply chain

4.1 Principles of **supply chains** in the animal management sector.

Range:
Supply chain – Raw materials, suppliers, manufacturers, distributors, retail, customers.

What do learners need to learn?	Skills
How legislation and regulation impact the supply chain in relation to animal management sector: • Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) • The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018 • Animal Welfare Act 2006 • The Welfare of Animals (Transport) (England) Order 2006 • Veterinary Surgeons Act 1966. The importance of efficiency and interdependency in a supply chain considering the following and their role in the sector: • suppliers • distributors • customers • supply chain assurance • ethics. The importance of ethical sourcing of stock and services: • feeds (raw, live) • bedding • clinical supplies • equipment including PPE and animal housing • deadstock/cadaver disposal services • traceability. The importance of welfare standards and ethical sourcing of animals: • pet trade • dealers • reputable breeders • wild-caught • captive-hatched (wild parents) • captive-bred (wild parents) (domestic parents) (surplus zoo stock) • traceability. Different services in the supply chain for the animal management sector: • live feed distributers • wholesalers • fallen stock services • crematorium • boarding kennels	CSA, CSB, CSC, CSD, CSE, EC1, EC4, EC5, MC1, MC2, MC3, MC5, MC6, MC9, MC10, DC1, DC4, DC5, DC6

• clinical/laboratory suppliers • veterinary services • supply of animals (hobbyists, breeders). Different ways in which the supply chain is sequenced and operates. The difference between primary, secondary and tertiary suppliers. Implications of failing to meet supply chain demands on: • quantity • quality • safety – human and animal • animal welfare • staff wellbeing • business model. External influences on the supply chain and the effect they may have: • political (trade agreements) • economic (price of raw materials, interest rates) • socio-cultural (dietary preferences and trends) • technological (automated operational procedures) • legislative (amendments to use of restricted goods/products) • environmental (carbon footprint, climate change). Customer base – number, type, characteristics, market segments. Competitor analysis – direct and indirect competitors. Types of procurement (bulk ordering, direct purchase) and their suitability for different situations. What terms of business agreements are.	

4.2 **Principles** of consumables and **stock** management in the animal management sector.

Range:
Principles – Stock rotation, storage requirements, animal welfare, monitoring and maintaining stock levels to meet supply and demand, dealing with deliveries, maintaining records.
Stock – Perishable, non-perishable, feed, bedding, veterinary medicines and equipment, animals, husbandry equipment, maintenance materials.

What do learners need to learn?	**Skills**
How legislation, regulation and codes of practice impact stock management principles in the animal management sector: • Veterinary Medicines Regulations 2013 • Department for Environment, Food and Rural Affairs (DEFRA) Animal and Plant Health Agency (APHA) codes of practice (individual animals including rabbit, guinea pig, rodents) • The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018	CSA, CSB, CSC, CSD, CSE, EC1, EC4, EC5, MC1, MC2, MC3, MC5, MC6, MC9, MC10, DC1, DC4, DC5,

• Animal Welfare Act 2006. How the principles of stock management are applied in different types of business within this sector and for different purposes: • veterinary practice • zoo • reputable breeders • pet store/shop • boarding kennels/catteries • grooming. Implications to businesses of ineffective management of stock including: • cost • wastage • compliance with relevant legislation and codes of practice. Methods of storing products to include: • perishable (including feeds, medication, bedding) • non-perishable items (including blankets, restraint equipment, grooming equipment, tools) • security. Methods of ordering and using stock to meet supply and demand: • stock take • expiry dates • seasonality • location • minimum and maximum thresholds • first in first out (FIFO). Consequences of non-compliance with legislation, regulation and codes of practice (prosecution, fines, loss of licence, loss of reputation, animal welfare).	DC6

5 Animal learning theories

5.1 Principles of learning theories.

What do learners need to learn?	Skills
Legislation and regulation which needs to be considered in the scope of learning theories: • Animal Welfare Act 2006 • The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018. Consideration of animal sentience and its definition when adopting learning theories and principles. Key learning theories, their principles, species suitability and how they impact animal behaviours: • Higher learning including: o definition of social, observational, latent and insight learning, cognition o importance of captive animals learning natural behaviours o innate behaviours o how socialisation at key stages affects behavioural development o key aspects on how nature/nurture can influence behavioural development o imprinting and the possible impact of hand rearing o factors affecting behaviour (evolution, emotional state, life stage, health, diet). Voluntary versus involuntary behaviours and the training theories they are associated with: • Non-associative (stimulus response) learning: o definition of habituation and sensitisation o application of non-associative (stimulus response) learning for wild, zoo and domestic animals o desensitisation for animals (including loud or unusual noises, unusual environment, other animals. • Classical conditioning (associative learning): o definition o conditioned and unconditioned stimulus o the studies behind associative learning including Pavlov's dogs. • Operant conditioning (associative learning): o definition o direct stimulus, indirect stimulus (external or internal) o the studies behind associative learning including Skinner. • Application of the quadrants of operant conditioning: o types of reinforcement (positive and negative) o types of punishment (positive and negative) relationship and interaction between quadrants and emotional responses and fallouts o least intrusive, minimally aversive (LIMA). • Appropriate techniques:	CSA, CSB, CSC, CSD, CSE, CSF, EC1, EC4, EC5

○ identification of appropriate techniques for training working animals (service/assistant animals) service ○ for wild, zoo and domestic animals ○ individual animal experience (rescue/lost/abused/abandoned).	

6 Anatomy and physiology

6.1 The structure and function of the digestive system in relation to animal physiology.

What do learners need to learn?	Skills
The structure and function of the monogastric digestive system to include the components: • mouth – including types of teeth (incisors, canine, premolar, molar) • oesophagus • stomach • small intestine (duodenum, jejunum, ileum) • large intestine (caecum, colon, rectum) • accessory organs (pancreas, gall bladder, salivary glands). The types of monogastric digestive systems: • carnivorous • modified-monogastric. The structure, function and components of the hindgut fermenter digestive system to include the fermentation in the caecum: • the role of coprophagia in some hindgut species. The structure, function and components of the ruminant digestive system to include the compartments of a stomach (rumen, reticulum, omasum, abomasum): • the role of microbes in digestion. Comparison of the structure and function of the following components of different taxa: • Aves – beak, crop, gizzard, proventriculus, caeca, cloaca • Mammalia – marine mammal dentition • Reptilia and amphibia – species specific adaptations, cloaca, backwards-facing teeth, acid levels for whole prey, jaw structure • Invertebrate – mandibulates or haustellate.	CSA, EC4, EC5

6.2 The structure and function of the respiratory system in relation to animal physiology.

What do learners need to learn?	Skills
The structure and function of the respiratory system including: • structure – nasal chambers, larynx, trachea, bronchi, bronchioles, lungs, alveoli and diaphragm • function – gas exchange in the alveoli and ventilation of the lungs. The process of inspiration and expiration. The definition of aerobic and anaerobic respiration and the implications to the animal. The link between the circulatory and the respiratory system and their roles: haemoglobin, oxyhaemoglobin, myoglobin. Comparison of the structure and function of the following components of different taxa: • Aves – air sacs, pneumatic skeletal system, the process of inspiration and expiration • Fish – gills, lungs • Reptilia and amphibia – skin, positioning of lungs • Invertebrate – spiracles.	CSA, EC4, EC5

6.3 The structure and function of the circulatory system in relation to animal physiology.

What do learners need to learn?	Skills
The structure and function of the mammalian circulatory system to include: • blood (blood cell formation and composition) – plasma, erythrocytes, leukocytes and platelets • heart (four chambers, aorta, vena cava, pulmonary vein, pulmonary artery, bicuspid and tricuspid valves, chordae tendineae, sinoatrial node, atrioventricular node, bundle of His and Purkinje fibres) • the role of each of the structures in the heartbeat • relative structure and function of blood vessels (capillaries, veins and arteries) • heart rate and how it may change dependent on external factors (environmental temperature, exercise, fight or flight). The structure and function of the lymphatic system to include: • glands and vessels • immune system – thymus, T-lymphocytes B-lymphocytes. Functions to include: • drain excess fluid • aid in fat digestion • transport of materials. Comparison of the structure and function of the following components of different taxa: • Aves – double circulatory system • Fish – single circulatory system, two-chambered heart	CSA, EC4, EC5

• Reptilia and amphibia – adapted circulation, double circulatory system, three-chambered or four-chambered heart • invertebrate – open circulatory system.	

6.4 The structure and function of the endocrine system in relation to animal physiology.

What do learners need to learn?	**Skills**
The structure and function of the major endocrine glands to include their location: • hypothalamus • pituitary gland • pancreas (endocrine) • adrenal • thyroid and parathyroid • ovaries • testes. The effects and controls of hormonal mechanisms: • circulating hormones (insulin) versus locally acting hormones (histamine) • homeostasis in relation to sugar and water levels in the blood • requirement of receptors on cell surface • thermoregulation and homeostasis (endotherms and ectotherms).	CSA, EC4, EC5

6.5 The structure and function of the musculoskeletal system in relation to animal physiology.

What do learners need to learn?	**Skills**

The structure, function and components of the mammalian musculoskeletal system, to include their location:
• Skull:
  ○ cranium
  ○ mandible
  ○ maxilla.
• Vertebrae:
  ○ atlas and axis
  ○ cervical
  ○ thoracic
  ○ lumbar
  ○ sacrum
  ○ caudal/coccygeal.
• Sternum
• Clavicle
• Hyoid (cats)
• Rib cage
• Baculum
• Fore limb:
  ○ scapula
  ○ humerus
	CSA, EC4, EC5

    - radius
    - ulna
    - carpals
    - metacarpals
    - phalanges.
- Hind limb:
    - pelvis
    - femur
    - patella
    - tibia
    - fibula
    - tarsals
    - metatarsals
    - phalanges.

Musculoskeletal adaptations for mammals and how they adapt to their environment:

- aquatic (cetaceans)
- flying (bats, flying squirrels)
- hopping (rabbits)
- running (cheetah, lion, equine)
- predator/prey (big cats, ungulates).

How the muscles control movement of the skeleton:

- muscles
- tendons
- ligaments.

Joint types and how they work:

- synovial
- hinge
- ball and socket
- condyloid (irregular)
- pivot.

Comparison of the structure and function of the following components of different taxa:

- Aves – pneumatic (hollow) bones
- Fish – cartilaginous
- Reptilia – shells
- Invertebrate – exoskeleton.

6.6 The structure and function of the nervous system in relation to animal physiology.

What do learners need to learn?	**Skills**
The structure and function of the brain to include: • forebrain (thalamus, hypothalamus, cerebral cortex and limbic system) • midbrain (reticular formation and neuron receptors) • hindbrain (medulla oblongata, cerebellum and pons). The main components which make up the central, peripheral and autonomic nervous systems and how they function and link to other organs and systems: • central nervous system • peripheral nervous system (afferent and efferent) • autonomic nervous system (sympathetic and parasympathetic actions). The structure and function of the main senses and links to their stimuli: • eye (cornea, pupil, iris, ciliary body, lens, sclera, retina (rod and cone cells), choroid, fovea, optic disc, optic nerve, medial and lateral rectus muscles) • ear (pinna, auditory meatus, tympanic membrane, malleus, incus, stapes, oval window, round window, cochlea, organ of Corti, cochlear nerve, olfactory bulb) • nose (nasal chambers, turbinates, olfactory nerve, olfactory bulb) • mouth (taste buds, soft palate, hard palate) • touch (skin receptors). Comparison of senses between predator and prey. Specialised senses and why they have evolved: • tactile organs (platypus beak) • taste and smell (Jacobson organ) • electroreception (Ampullae of Lorenzini) • echolocation (bats and dolphins) • lateral line and vibrissae (fish).	CSA, EC4, EC5

6.7 The structure and function of the excretory system in relation to animal physiology.

What do learners need to learn?	Skills
The structure and function of the excretory system: • kidneys • nephron (ultrafiltration and reabsorption) • ureters • bladder (voluntary and involuntary control) • urethra. How the excretory system links to the endocrine system and the digestive system. Comparison of the structure and function of the excretory system within different taxa: • Aves and Reptilia – cloaca • Mammalia – desert mammals, preventing dehydration, elongated loops of Henle • Aquatic animals – marine or freshwater, water filtration (link to water quality).	CSA, EC4, EC5

6.8 The structure and function of the reproductive system in relation to animal physiology.

What do learners need to learn?	Skills
The structure and function of the reproductive system to include the location of: • penis • prepuce • urethra • bulbus glandis • epididymis • vas deferens • testis (testosterone and oestrogen) and prostate • infundibulum • magnum • isthmus • cloaca • vulva • vagina • cervix • uterus • oviduct and ovaries. Anatomy adaptations in: • males (cats, whales, pigs, snakes) • female (hyena, bonobo, pigs, cats, marsupials, monotremes, poultry).	CSA, EC4, EC5

The oestrus cycle: • proestrus, oestrus, metoestrus (dioestrus), anoestrus • hormonal control (oestrogen, progesterone, luteinising hormone (LH) and follicle stimulating hormone (FSH)) • human influence on breeding (hormonal injections). Sexual reproduction: • copulation, fertilisation, implantation, gestation and parturition (prolactin and oxytocin).	

6.9 The structure and function of the integumentary system in relation to animal physiology.

What do learners need to learn?	**Skills**

The structure and function of the integumentary system:
• Epidermis
• Dermis:
  ○ first line of defence
  ○ blood vessels
  ○ sensory nerves receptors (thermoreceptors)
  ○ response to sensations (touch, pain, itch, heat, cold).
• Hypodermis:
  ○ participates in wound healing
  ○ acts as a physical barrier
  ○ hair follicles
  ○ sebaceous and sweat glands
  ○ specialised structures (claw, hoof, horns).
 	
Role of the integumentary system as the primary defence mechanism in immunology.
 	
Comparison of the structure and function of the following components of different taxa:
• Aves – feathers, bills
• Fish – scales, shells, gills, fins, camouflage
• Reptilia and amphibia - shells, scales, shedding, moist skin, camouflage
• Invertebrate – exoskeleton, camouflage.
	CSA, EC4, EC5

7 Animal health

7.1 **Categories** and **techniques** of animal **medication**.

Range:
Categories – Prescribed medicine (instructed by the vet or management), non-prescribed medicine (instructed by management).
Techniques – Topical, enteral, parenteral, inhalation.
Medication – Antibiotics, ectoparasiticides, endoparasiticides, vaccines, anaesthetics, anti-inflammatories, antifungals, anti-emetics/emetics, analgesics, antiviral.

What do learners need to learn?	Skills
The requirements regarding animal medication under legislation and regulation: • Animal Welfare Act 2006 • Veterinary Surgeons Act 1966 • Veterinary Medicine Regulations 2013 • Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018. The different types of animal medication used and the situations and scenarios they may be required in: • domesticated • wild captive • wild non-captive. The processes in managing and storing veterinary medicines: • medicine types (POM-V, POM-VPS, NFA-VPS, AVM-GSL) • controlled drugs storage • Suitably Qualified Person (SQP) • stock (stock levels, ordering, storage, recording, waste management). Techniques used to administer medicines and their suitability for different purposes: • enteral (oral, rectal) • parenteral (topical) • parenteral (subcutaneous, intramuscular, intravenous) • inhalation. Legal requirements of medical treatment that can be undertaken by non-qualified staff. Consequences for carrying out procedures that are not licensed and constitute a breach of legislation in relation to section 3 of Veterinary Surgeons Act 1966 (fines, prosecution).	CSA, CSC, CSD, EC4, EC5, DC1, DC4, DC5, DC6

7.2 **Diseases, disorders, parasites** and notifiable diseases that can affect animals.

Range:
Diseases – Fungal, viral, bacterial, notifiable, zoonotic.
Disorders – Nutritional, endocrine, physical and metabolic.
Parasites – Endo (internal) and ecto (external).

What do learners need to learn?	**Skills**

The signs and symptoms of diseases, disorders and parasites and how the biological systems may be affected.
 	
How diseases, disorders and parasites are transmitted (direct, indirect, airborne, inhalation, droplet, ingestion, vector, fomite).
 	
How diseases, disorders and parasites can affect animals in various life stages (neonate, juvenile, adult (working, breeding), senior, geriatric).
 	
How diseases, disorders and parasites can affect animals:
• health and welfare
• physiology
• biological systems
• successful rearing.
 	
How diseases, disorders and parasites are prevented:
• PPE
• husbandry
• biosecurity.
 	
How diseases, disorders and parasites are treated in terms of:
• health and welfare
  ○ supportive care
  ○ husbandry
  ○ biosecurity.
• anatomy and physiology.
 	
Notifiable diseases and actions taken if suspected and when identified/ confirmed:
• Rabies
• Avian flu
• Swine flu
• Bovine Spongiform Encephalopathy (BSE)
• Tuberculosis
• Bluetongue
• Foot and mouth
• Newcastle disease.
	CSA, CSB, CSC, CSD, EC4, EC5

Zoonotic diseases and actions taken if suspected and when identified/ confirmed (for animals and humans):

- Ringworm
- Tapeworm
- Rabies
- Salmonella
- Leptospirosis
- Campylobacteriosis
- Toxocara canis/catis and Toxoplasma gondii.

The symptoms and routes of transmission of typical diseases:

- Bacterial diseases:
  - Leptospirosis
  - Brucellosis
  - Tuberculosis
  - Salmonella
  - Campylobacter
  - E. Coli
  - Bordetella bronchiseptica.
- Viral diseases:
  - Rabies
  - Distemper
  - Parvovirus
  - Influenza (canine, feline, equine, avian, swine)
  - Feline herpes virus
  - Feline calicivirus
  - Feline leukaemia
  - Feline Immunodeficiency Virus (FIV)
  - Infectious canine hepatitis
  - Myxomatosis
  - Bluetongue
  - Foot and mouth
  - Rabbit Haemorrhagic Disease (RHD).
- Fungal diseases:
  - Ringworm.
- Protozoan diseases:
  - Giardia
  - Toxoplasma gondii.
- Prion diseases:
  - BSE
  - Chronic wasting disease.

The symptoms and routes of transmission of typical parasites:

- Parasites:
  - Endoparasites (roundworms, tapeworms, protozoa, flukes)
  - Ectoparasites (ticks, fleas, lice, mites).

The causes and symptoms of typical disorders:

- Nutritional disorders:
  - Rickets
  - Scurvy
  - Anorexia
  - Obesity
  - Urolithiasis
  - Laminitis
  - Taurine deficiency.
- Endocrine disorders:
  - Cushing
  - Addison
  - Hypo/hyperthyroidism.
- Physical disorders:
  - Lameness
  - Egg binding
  - Arthritis.
- Metabolic disorders:
  - Diabetes mellitus
  - Metabolic bone disease
  - Milk fever/eclampsia.

7.3 First aid for animals including for **wounds** and **conditions** using a **first aid kit**.

Range:
Wounds – Abrasions, lacerations, contusions, concussions, punctures, incisions, surgical, thermal, chemical, electrical, bites, stings, fractures, foreign bodies, haemorrhage, swelling.
Conditions – Shock, convulsion, respiratory arrest, choking, poison, allergens, fly strike, hyperthermia, hypothermia, electrocution, severe dehydration.
First aid kit – Selection of bandages, cotton wool, sterile dressing materials, adhesive tape, rectal thermometer, tweezers, gloves, scissors, hand sanitiser, eye wash, antiseptic solution, tick remover, contact details for the local veterinary practice, carrier bag, blanket.

What do learners need to learn?	**Skills**
The aims and limitations of first aid and considerations of the welfare of the animal under the following legislation: • Animal Welfare Act 2006 • Veterinary Surgeons Act 1966. How to assess the environment for hazards and reduce the risk to both	CSA, CSB, CSC, CSD, CSF, EC1, EC2, EC4, EC5, EC6

human and animal. The contents of an animal first aid kit and its purpose. How to apply the relevant first aid treatment for wounds and conditions experienced by animals including when to seek professional advice. Considerations when applying effective first aid treatment (to include weather, location of wound, husbandry conditions, restraints, type of medication application).	

Guidance for delivery

A variety of active teaching and learning activities should be used to engage learners in this Animal Management Core Pathway. Opportunities for visits/engagement with local industry and employers should be provided throughout the delivery of the content – where appropriate, local employers could present details of recent projects, problems faced and how they were overcome. Learners' work placement experiences could be presented to peers detailing where knowledge and skills within the content was seen in practice.

Formative assessment for the content may include verbal Q&A, presentations to peers, observation of stock control activities etc. Reinforcement of learning can be encouraged through revisiting learning, group discussions and the establishment of a peer support system within the cohort.

Providers must ensure content is delivered in line with current, up-to-date industry practices, which will require:

- current industry legislation, regulations and technical information
- teaching coverage representing the type of equipment currently available and accepted for use in the UK industry.

Suggested learning resources

Books

A-Level Business Studies: Knowledge Practice Workbook AQA: 100 questions + Answers, Resources P, (2023)
Published by: Independently published

Animal Physiology, Hill W, Cavanaugh DJ et al, (2022), International 5th Edition
Published by: OUP USA

Animal Restraint for Veterinary Professionals, Sheldon CC, Topel J, (2023), 3rd Edition
Published by: Elsevier

Arthur's Veterinary Reproduction and Obstetrics, Noakes DE, Parkinson TJ et al, (2018), 10th Edition
Published by: Saunders

Aspinall's Complete textbook of Veterinary Nursing, Lakeman N, Aspinall V, (2016), 3rd Edition
Published by: Elsevier, Oxford

Biosecurity in Animal Production and Veterinary Medicine: From principles to practice, Dewulf J, Immerseel FV, (2020)
Published by: CABI Publishing

Biosecurity: Understanding, Assessing, and Preventing the Threat, Burnette R, (2013)
Published by: Wiley

Book Vet Tech, Parks SQS, (2020)
Published by: Independently published

BSAVA Textbook of Veterinary Nursing (BSAVA British Small Animal Veterinary Association), Cooper B, Mullineaux E et al, (2020), 6th Edition
Published by: BSAVA.

Comparative Anatomy of the Vertebrates, Kent GC, Carr RK, (2000), 9th Edition
Published by: McGraw-Hill Higher Education.

Cunningham's Textbook of Veterinary Physiology, Bradely T, Klein G, (2019), 6th Edition
Published by: Saunders

Exotic Animal Care and Management, Judah V, Nuttall K, (2016), 2nd Edition

Published by: CENGAGE Delmar Learning
Farmwise – Your Essential Guide to Health and Safety in Agriculture, (2017), 3rd Edition
Published by: HSE
Functional Anatomy and Physiology of Domestic Animals, Reece WO, Rowe EW, (2009), 5th Edition
Published by: Wiley-Blackwell
Health & Safety at Work Essentials, Freeths LLP, (2022), 9th Edition
Published by: Lawpack Publishing Ltd
Health and Safety at Work: An Essential Guide for Managers, Stranks, J, (2019), 10th Edition
Published by: Kogan Page
Introduction to Health and Safety at Work: for the NEBOSH National General Certificate in Occupational Health and Safety, Hughes P, Ferrett E, (2020), 7th Edition
Published by: Routledge
Introduction to Veterinary Anatomy and Physiology, Aspinall V, Cappello M, (2020), 4th Edition
Published by: Elsevier Saunders
Occupational Health and Safety Management: A Practical Approach, Reese CD, (2017), 3rd Edition
Published by: CRC Press
Restraint and Handling for Veterinary Technicians and Assistants, Ballard B, Rockett J, (2009), 1st Edition
Published by: Cengage
Supply Chain Management: Strategy, Planning, and Operation, Chopra S, (2019), 7th Edition
Published by: Pearson
The Complete Textbook of Animal Health and Welfare, Williams J, (2009)
Published by: Elsevier/Saunders
The Dissection of Vertebrates, De Iulii G, Pulerà D, (2019), 3rd Edition
Published by: Academic Press Inc.
The Sixth Extinction: An Unnatural History, Kolbert E, (2014)
Published by: Henry Holt and Company
Veterinary Anatomy Coloring Book, Saunders, (2015), 2nd Edition
Published by: Saunders
Veterinary Anatomy Coloring Book: Animal Anatomy and Veterinary Physiology Coloring
Veterinary Infection Prevention and Control, Caveney L, Jones B et al, (2011), 1st Edition
Published by: Wiley-Blackwell
Veterinary Infection Prevention and Control, Caveney L, Jones B et al, (2011)
Published by: Wiley-Blackwell
Veterinary Practice Management: A Practical Guide, Shilcock M, Stutchfield G, (2003), 2nd Edition
Published by: Saunders
Veterinary Reproduction and Obstetrics, Noakes DE, Parkinson TJ et al, (2018), 10th Edition
Published by: Elsevier

Websites

Animal Welfare Journal – UFAW
www.cabtsg.org
Ethical Consumer
www.ethicalconsumer.org/
Friends of the Earth
https://friendsoftheearth.uk
Gov.uk: Animal by-products categories, site approval, hygiene and disposal
www.gov.uk/guidance/animal-by-product-categories-site-approval-hygiene-and-disposal
Guidance on the classification and assessment of waste (1st Edition v1.2.GB)
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1021051/Waste_classification_technical_guidance_WM3.pdf
Health and Safety Executive (HSE)
www.hse.gov.uk
Journal of Animal Physiology and Nutrition
https://onlinelibrary.wiley.com/journal/14390396
Safety Culture
www.safetyculture.com
The Association for the Study of Animal Behaviour
www.asab.org/
The Controlled Waste (England and Wales) Regulations 2012
www.legislation.gov.uk/uksi/2012/811/schedule/1/made
The Environment Agency (2001). Towards sustainable agricultural waste management
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291600/geho0003bieo-e-e.pdf
UK Legislation
www.legislation.gov.uk
UN Sustainable Development Goals
www.undp.org/sustainable-development-goals
Waste Framework Directive (2023)
https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en
Waste Management and Climate Change. *Local Environment* Paper
www.frankackerman.com/publications/wasterecycling/Waste_Management_Climate_Change.pdf

306 Animal Science Core Pathway

Level:	3
GLH:	210
Assessment method:	Externally set exam Employer-set Project

What is this component about?

An introduction to Animal Management and Science.

It covers the theoretical knowledge of animal science sectors and various disciplines that are indicative of the industries.

Learners gain an understanding of what theoretical principles and practices, integral to the industry and sector, are required to work in it.

Learners will develop their knowledge and understanding of:

- fundamental health and safety principles
- principles of biosecurity
- anatomy and physiology
- types and sources of nutrients required by animals
- animal behaviour.

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

- What are the different applications in animal science?
- What are the different job roles in animal science?
- What does the future look like for this sector and where could it take me?

Underpinning knowledge outcomes

On completion of the Animal Science Core Pathway, learners will understand:

1. Health and safety
2. Sustainability
3. Biosecurity
4. Supply chain
5. Anatomy and physiology
6. Biological cells and tissues
7. Nutrition
8. Animal behaviour

Completion of the Animal Science Core Pathway will give learners the opportunity to develop their maths, English and digital skills. Details are presented in the skills section of each criteria.

Content

1 Health and safety

1.1 **Hazards**, **risks** and **control measures** associated with working in the animal science sector.

Range:
Hazards – Lone working, hazardous materials (biomaterials, slurry, gases), equipment, location, zoonotic disease, biohazards, working at height, septic tanks.
Risks – Zoonoses, crushing, kicking, biting, contamination or asphyxiation by hazardous materials, contact with machinery and equipment, slips, trips and falls, drowning, allergens (animal, environmental), wellbeing, compassion fatigue, burnout.
Control measures – Agreed contact times, carrying mobile phone/radio, risk assessment, awareness of location of work, awareness of expected time of return, biosecurity animal isolation, appropriate handling and restraint techniques and equipment, personal hygiene, safe means of access systems, Personal Protective Equipment (PPE), machinery and equipment guards, safe stop procedures, working schedules, training, lone working policy, employee health and welfare policy, occupational health.

What do learners need to learn?	**Skills**
Lone working responsibilities for employee and employer under – Health and Safety at Work Act 1974. Management of Health and Safety at Work Regulations 1999 – company policy, communication requirements, risk assessment requirements. How legislation and regulation impact safe working: • Health and Safety at Work Act 1974 • Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) • Equality Act 2010 • Provisions and Use of Work Equipment Regulations 1998 (PUWER) • Waste from Electrical and Electronic Equipment, Personal protective equipment at Work Regulations 1992 (amended 2002) • Control of Substances Hazardous to Health Regulations (COSHH) • The Manual Handling Operations Regulations 1992 • Health and Safety (First Aid) Regulations 1981 • Electricity at Work Regulations 1989 • Regulatory Reforms (Fire Safety) (England) Order 2005 • Control of Waste Regulations (England and Wales) 2012 • Environmental Protection Act 1990 • Smoke Free (Premises and Enforcement) Regulations 2006 • Health and Safety (Safety Signs and Signals) Regulations 1996. Hazards and associated risks to humans when working in the animal science sector. The different associated risks when dealing with a variety of species (large zoo mammals, large birds of prey, venomous animals, dangerous dogs, category 1 species, farm animals). Associated risks when working with high-risk animals (domestic animals, feral animals, wild animals, wild captive animals) and high-risk situations (direct contact).	CSB, CSA, CSC, CSD, CSF, EC1, EC2, EC3, EC5, EC6, MC5, MC6, DC1, DC2, DC3

The purpose for putting in place control measures and precautions to manage and minimise risks.

The types and purpose of appropriate standard PPE used:

- eye protection
- masks (disposable/respirator/specialist respiratory)
- barrier cream
- gloves (disposable/gauntlets/working)
- aprons
- overalls
- appropriate footwear
- ear defenders
- protective head gear
- lab coats.

The importance of ongoing dynamic risk assessment in different animal environments which may be impacted by:

- indoor and outdoor
- field work
- weather conditions
- interactions with the public
- environmental considerations (contamination).

Risks associated with control measures.

Hierarchy of control measures that can be put in place to minimise risks:

- Elimination – redesign a job so that the hazard is removed or eliminated.
- Substitution – replace a material or process with a less hazardous one such as use of different equipment/machinery.
- Engineering controls – separate the hazard from operators by methods such as enclosing or guarding dangerous items of machinery/equipment, directing moving machinery/vehicles, marked walkways, designated work areas.
- Administrative controls – identify and implement policies and procedures needed to work safely such as safety/warning signage, training, certification, safe working practices and discipline, first aid provision, environmental protection provision.
- Personal Protective Equipment (PPE) – where risk cannot be eliminated or sufficiently controlled to a reasonably practicable level using the above measures, use protective equipment to minimise the consequences of the risk.

1.2 Procedures and contingency and emergency **plans** to follow when dealing with **emergency situations** in the animal science sector.

Range:
Plans – Personnel, welfare of animals, environment.
Emergency situations – Fire, medical, animal escape, animal injury, animal attack, unauthorised public access, power cut, natural disaster, extreme weather (drought, flooding, wind, snow) disease outbreak, contact with electricity, gas leak, water supply (lack of and/or contamination),

activist activity, lack of staff, vehicles, tools, machinery or equipment failure, accidents in remote/restricted access locations.

What do learners need to learn?	Skills
How the following legislation and regulation impacts emergency planning: • Health and Safety at Work Act 1974 • Control of Substances Hazardous to Health (COSHH) 2002 • Reporting of Injuries Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013 • Zoonoses Order 1989 • Regulatory Reform (Fire Safety) Order 2005 • Movement of Animals (England) Order 2006 • Firearms Act 1968 • Zoo Licensing Act 1981. Emergency situations that can lead to health and safety risks and the associated control measures that should be applied. Correct procedures to follow when encountering an accident, incident or medical emergency including communication, ensuring safety of self and others, including the delegation of roles in an emergency following an emergency action plan. The importance of having appropriate contingency and emergency plans and the consequences (harm/injury, animal welfare, prosecution, reputation, staff moral) to the business, animals and individuals if these plans are not in place. The requirements of staff training (animal and human first aid, fire safety). Which organisations need to be made aware in an emergency situation – Department for Environment, Food and Rural Affairs (DEFRA), Animal and Plant Health Agency (APHA), Health and Safety Executive (HSE). What is considered a danger to the public and the services to be notified – emergency services, local authorities, power companies, HSE. The requirements of staff training (animal and human first aid, fire safety). Emergency veterinary procedures: animal first aid – dangerous animals, field work (artificial insemination technician, ecological field work – as vets). Scenarios – arterial bleeds in large animals, severe dehydration, hyperthermia and hypothermia. The importance of accident and incident reporting in accordance with the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR). The implications of non-compliance of RIDDOR and with HSE – to the individual and to the business (prosecution, reputation, staff moral).	CSA, CSB, CSC, CSD, CSE, CSF, EC1, EC2, EC3, EC4, EC5, EC6, MC5, DC1, DC2, DC3

2 Sustainability

2.1 **Waste** management **principles** in the animal science sector.

Range:
Waste – Consumable, non-consumable, commercial, domestic, laboratory, pharmaceutical, infectious clinical, non-infectious clinical, organic, inorganic, recyclable, non-recyclable, hazardous, biohazardous.
Principles – The five Rs of waste management – refuse, reduce, reuse, repurpose, recycle.

What do learners need to learn?	**Skills**
The key requirements of legislation and regulations that affect waste management: • Controlled waste (England and Wales) Regulations 2012 • Nitrate Vulnerable Zones (NVZ) EC Directive • Environmental Protection Act 1990 • Environment Agency rules and associated derogations • The Animal By-Products (Enforcement) (England) Regulations 2013 • The Waste (England and Wales) Regulations 2011 • Clean Air Act 1993. Identification of the different classifications of waste products and how they are managed and processed by licenced carriers. Types of waste that require specific actions and what those actions are and why: • controlled • hazardous • animal (dog hair, feathers, fur) • clinical • offensive (faeces) • biohazard. The purpose and benefits of waste management plans for animal environments including financial implications of ineffective waste management. Consequences of non-compliance with legal and regulatory requirements when managing waste (financial implications, prosecution, public reputation, environmental impact).	CSA, CSB, CSC, CSD, CSE, CSF, EC4, EC5, MC5, MC6, MC10, DC4

3 Biosecurity

3.1 Biosecurity **control measures** in the animal science sector to prevent the spread of disease.

Range:
Control measures – Foot dips, sanitation stations, air purification systems, drench showers, staff and visitors' limitation, buildings equipment and vehicles cleanliness/usage protocols, animal management, control of parasites, pests and vermin, inspection, monitoring, regulation, passports, border controls, (including illegal trade) quarantine, isolation, cleaning protocols, food storage, water cleanliness, PPE, exclusion zones, physical barriers, barrier nursing, testing and inoculation, vaccination, elimination of vectors.

What do learners need to learn?	**Skills**
The requirements of biosecurity under the following: • Animal Welfare Act 2006 • Control of Substances Hazardous to Health (COSHH) 2002 • Zoonoses Order (Amendment) (England) 2021 • Animal Health Act 2002 • Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The purpose of biosecurity in the animal science sector: • prevent/control disease spread • prevent/control the introduction of a new disease • maintain animal welfare • maintain human health • maintain species. Codes of practice under Department for Environment, Food and Rural Affairs (DEFRA) Animal and Plant Health Agency (APHA): • standards and organisational policies applied to maintenance of working environment • implications of not following the codes of practice. How the following factors influence biosecurity: • national/ international trade • new technologies • disease outbreak • disease control • outbreak management implications • border control • quarantine • illegal pet trade • smuggling. Definitions of endemic, pandemic, epidemic, exotic in relation to disease and how they may influence biosecurity. Types of pathogens (bacteria, viruses, fungi, protozoa, parasites including endo and ecto). Zoonotic and notifiable disease: • definition of zoonotic, anthroponotic and notifiable • role of APHA and DEFRA	CSA, CSB, CSC, CSD, CSF, EC1, EC4, EC5, MC1, MC2, MC3, MC4, MC5, DC4

- movement and restriction zones for notifiable disease (immediate, surveillance zones).

Disease transmission:

- direct
- indirect
- airborne
- vectors
- fomites
- inhalation
- ingestion
- environment.

The control measures to prevent the spread of disease.

Implications of the lack of biosecurity:

- risk to wider community
- reduction in performance
- reduction in business
- effects on staff – illness, wellbeing and performance
- loss of stock
- animal welfare
- environmental
- economy.

Biosecurity risk factors in different types of animal science situations:

- Environmental:
  - humidity
  - ventilation
  - temperature
  - construction materials
  - resources
  - wildlife
  - drainage/organic pollution.

- Animal health:
  - carrier status – disease incubation period
  - vaccination status
  - stocking density
  - vector control methods.

- Husbandry:
  - food/water provision (contamination)
  - hygiene (people including PPE, animals, accommodation).

4 Supply chain

4.1 Principles of **supply chains** in the animal science sector.

Range:
Supply chain – Raw materials, suppliers, manufacturers, distributors, retail, customers.

What do learners need to learn?	Skills
How legislation and regulation impact the supply chain in relation to the animal science sector: • Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) • The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018 • Animal Welfare Act 2006 • The Welfare of Animals (Transport) (England) Order 2006 • Veterinary Surgeons Act 1966 • Animal Scientific Procedures Act 1986. The importance of efficiency and interdependency in a supply chain considering the following and their role in the sector: • suppliers • distributors • customers • supply chain assurance • ethics. The importance of ethical sourcing of stock and services: • feeds (raw, live, wild) • bedding • clinical supplies • equipment including PPE and animal housing • dead stock/cadaver disposal services • traceability. The importance of welfare standards and ethical sourcing of animals: • international trade of animals • pet trade • dealers • hobbyists • reputable breeders • wild-caught • captive-hatched (wild parents) • captive-bred (wild parents) (domestic parents) • research facilities • traceability. Different services in the supply chain for the animal science sector: • live feed distributers	CSA, CSB, CSC, CSD, CSE, EC1, EC4, EC5, MC1, MC2, MC3, MC5, MC6, MC9, MC10, DC1, DC4, DC5, DC6

• wholesalers • fallen stock services • crematorium • boarding kennels • clinical/laboratory suppliers • veterinary services • supply of animals (hobbyists, breeders). Different ways in which the supply chain is sequenced and operates. Implications of failing to meet supply chain demands on: • quantity • quality • safety – human and animal • animal welfare • staff wellbeing • business model. External influences on the supply chain and the effect they may have: • political (trade agreements) • economic (price of raw materials, interest rates) • socio-cultural (dietary preferences and trends) • technological (automated operational procedures) • legislative (amendments to use of restricted goods/products) • environmental (carbon footprint, climate change). Customer base – number, type, characteristics, market segments. Competitor analysis – direct and indirect competitors. Types of procurement (bulk ordering, direct purchase) and their suitability for different situations. What terms of business agreements are.	

4.2 **Principles** of consumables and **stock** management in the animal science sector.

Range:
Principles – Stock rotation, storage requirements, animal welfare, monitoring and maintaining stock levels to meet supply and demand, dealing with deliveries, maintaining records.
Stock – Perishable, non-perishable, feed, bedding, veterinary medicines and equipment, animals, husbandry equipment, maintenance materials.

What do learners need to learn?	**Skills**
How legislation, regulation and codes of practice impacts stock management principles in the animal science sector: • Veterinary Medicines Regulations 2013 • Department for Environment, Food and Rural Affairs (DEFRA), Animal and Plant Health Agency (APHA) codes of practice (individual animals including rabbit, guinea pig, rodents)	CSA, CSB, CSC, CSD, CSE, EC1, EC4, EC5, MC1, MC2, MC3, MC5, MC6, MC9, MC10, DC1,

• The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018 • Animal Welfare Act 2006. How the principles of stock management are applied in different types of business within this sector and for different purposes: • live feed distributers • fallen stock services • crematorium • hunt kennels • clinical/laboratory suppliers • supply of animals (hobbyists, reputable breeders). Implications to businesses of ineffective management of stock including: • cost • wastage • compliance with relevant legislation and codes of practice. Methods of storing products to include: • perishable (feeds, medication, bedding) • non-perishable items (blankets, restraint equipment, grooming equipment, tools) • security. Consequences of non-compliance with legislation, regulation and codes of practice (prosecution, fines, loss of licence, loss of reputation, animal welfare).	DC4, DC5, DC6

5 Anatomy and physiology

5.1 The structure and function of the digestive system in relation to animal physiology.

What do learners need to learn?	Skills
The structure and function of the monogastric digestive system to include the components: • mouth – including types of teeth (incisors, canine, premolar, molar) • oesophagus • stomach • small intestine (duodenum, jejunum, ileum) • large intestine (caecum, colon, rectum) • accessory organs (pancreas, gall bladder, salivary glands, liver). The types of monogastric digestive systems: • carnivorous • modified-monogastric. The structure, function and components of the hindgut fermenter digestive system to include the fermentation in the caecum: • the role of coprophagia in some hindgut species. The structure, function and components of the ruminant digestive system to include the compartments of a stomach (rumen, reticulum, omasum, abomasum): • the role of microbes in digestion. Comparison of the structure and function of the following components of different taxa: • Aves – beak, crop, gizzard, proventriculus, caeca, cloaca • Mammalia – marine mammal dentition • Reptilia and Amphibia – species specific adaptations, cloaca, backwards-facing teeth, acid levels for whole prey, jaw structure • Invertebrate - mandibulates or haustellate.	CSA, EC4, EC5

5.2 The structure and function of the respiratory system in relation to animal physiology.

What do learners need to learn?	Skills
The structure and function of the respiratory system including: • structure – nasal chambers, larynx, trachea, bronchi, bronchioles, lungs, alveoli and diaphragm • function – gas exchange in the alveoli and ventilation of the lungs, The Bohr effect. The process of inspiration and expiration. The definition of aerobic and anaerobic respiration and the implications to the animal.	CSA, EC4, EC5

The link between the circulatory and the respiratory systems and their roles: haemoglobin, oxyhaemoglobin, myoglobin. Comparison of the structure and function of the following components of different taxa: • Aves – air sacs, pneumatic skeletal system, the process of inspiration and expiration • Fish – gills, lungs • Reptilia and Amphibia – skin, positioning of lungs • Invertebrate – spiracles.	

5.3 The structure and function of the circulatory system in relation to animal physiology.

What do learners need to learn?	**Skills**
The structure and function of the mammalian circulatory system to include: • blood (blood cell formation and composition) – plasma, erythrocytes, leukocytes and platelets. • heart (four chambers, aorta, vena cava, pulmonary vein, pulmonary artery, bicuspid and tricuspid valves, chordae tendineae, sinoatrial node, atrioventricular node, bundle of His and Purkinje fibres) • the role of each of the structures in the heartbeat • relative structure and function of blood vessels (capillaries, veins and arteries) • heart rate and how it may change dependent on external factors (environmental temperature, exercise, fight or flight). The structure and function of the lymphatic system to include: • glands and vessels • immune system – thymus, T-lymphocytes B-lymphocytes. Functions to include: • drain excess fluid • aid in fat digestion • transport of materials. Comparison of the structure and function of the following components of different taxa: • Aves – double circulatory system • Fish – single circulatory system, two-chambered heart • Reptilia and Amphibia – adapted circulation, double circulatory system, three-chambered or four-chambered heart • Invertebrate – open circulatory system.	CSA, EC4, EC5

5.4 The structure and function of the endocrine system in relation to animal physiology.

What do learners need to learn?	**Skills**
The structure and function of the major endocrine glands to include their location: • hypothalamus • pituitary gland • pancreas (endocrine) • adrenal	CSA, EC4, EC5

• thyroid and parathyroid • ovaries • testes. The effects and controls of hormonal mechanisms: • circulating hormones (insulin) versus locally acting hormones (histamine) • homeostasis in relation to sugar and water levels in the blood • requirement of receptors on cell surface • thermoregulation and homeostasis (endotherms and ectotherms).	

5.5 The structure and function of the musculoskeletal system in relation to animal physiology.

What do learners need to learn?	**Skills**

The structure, function and components of the mammalian musculoskeletal system, to include their location:
• Skull:
  ○ cranium
  ○ mandible
  ○ maxilla.
• Vertebrae:
  ○ atlas and axis
  ○ cervical
  ○ thoracic
  ○ lumbar
  ○ sacrum
  ○ caudal/coccygeal.
• Sternum
• Clavicle
• Hyoid (cats)
• Rib cage
• Baculum
• Fore limb:
  ○ scapula
  ○ humerus
  ○ radius
  ○ ulna
  ○ carpals
  ○ metacarpals
  ○ phalanges.
• Hind limb:
  ○ pelvis
  ○ femur
  ○ patella
  ○ tibia
  ○ fibula
  ○ tarsals
	CSA, EC4, EC5

○ metatarsals ○ phalanges. Musculoskeletal adaptations for mammals and how they adapt to their environment: • aquatic (cetaceans) • flying (bats, flying squirrels) • hopping (rabbits) • running (cheetah, lion, equine) • predator/prey (big cats, ungulates). How the muscles control movement of the skeleton: • muscles • tendons • ligaments. Joint types and how they work: • synovial • hinge • ball and socket • condyloid (irregular) • pivot. Comparison of the structure and function of the following components of different taxa: • Aves – pneumatic (hollow) bones • Fish – cartilaginous • Reptilia – shells • Invertebrate – exoskeleton.	

5.6 The structure and function of the nervous system in relation to animal physiology.

What do learners need to learn?	**Skills**
The structure and function of the brain to include: • forebrain (thalamus, hypothalamus, cerebral cortex and limbic system) • midbrain (reticular formation and neuron receptors) • hindbrain (medulla oblongata, cerebellum and pons). The main components which make up the central, peripheral and autonomic nervous systems and how they function and link to other organs and systems: • central nervous system • peripheral nervous system (afferent and efferent) • autonomic nervous system (sympathetic and parasympathetic actions).	CSA, EC4, EC5

The structure and function of the main senses and links to their stimuli: • eye (cornea, pupil, iris, ciliary body, lens, sclera, retina (rod and cone cells), choroid, fovea, optic disc, optic nerve, medial and lateral rectus muscles) • ear (pinna, auditory meatus, tympanic membrane, malleus, incus, stapes, oval window, round window, cochlea, organ of Corti, cochlear nerve, olfactory bulb) • nose (nasal chambers, turbinates, olfactory nerve, olfactory bulb) • mouth (taste buds, soft palate, hard palate) • touch (skin receptors). Comparison of senses between predator and prey. Specialised senses and why they have evolved: • tactile organs (platypus beak) • taste and smell (Jacobson organ) • electroreception (Ampullae of Lorenzini) • echolocation (bats and dolphins) • lateral line and vibrissae (fish).	

5.7 The structure and function of the excretory system in relation to animal physiology.

What do learners need to learn?	**Skills**
The structure and function of the excretory system: • kidneys • nephron (ultrafiltration and reabsorption) • ureters • bladder (voluntary and involuntary control) • urethra. How the excretory system links to the endocrine system and the digestive system. Comparison of the structure and function of the excretory system within different taxas: • Aves and Reptilia – cloaca • Mammalia – desert mammals – preventing dehydration, elongated loops of Henle • Aquatic animals – marine or freshwater, water filtration (link to water quality).	CSA, EC4, EC5

5.8 The structure and function of the reproductive system in relation to animal physiology.

What do learners need to learn?	Skills
The structure and function of the reproductive system to include the location of: • penis • prepuce • urethra • bulbus glandis • epididymis • vas deferens • testis (testosterone and oestrogen) and prostate • infundibulum • magnum • isthmus • cloaca • vulva • vagina • cervix • uterus • oviduct and ovaries. Anatomy adaptations in: • males (cats, whales, pigs, snakes) • females (hyena, bonobo, pigs, cats, marsupials, monotremes, poultry).	CSA, EC4, EC5

5.9 The structure and function of the integumentary system in relation to animal physiology.

What do learners need to learn?	Skills

The structure and function of the integumentary system:
• Epidermis
• Dermis:
  ○ first line of defence
  ○ blood vessels
  ○ sensory nerves receptors (thermoreceptors)
  ○ response to sensations (touch, pain, itch, heat, cold).
• Hypodermis:
  ○ participates in wound healing
  ○ acts as a physical barrier
  ○ hair follicles
  ○ sebaceous and sweat glands
  ○ specialised structures (claw, hoof, horns).
 	
Role of the integumentary system as the primary defence mechanism in immunology.
 	
Comparison of the structure and function of the following components of different taxa:
• Aves – feathers, bills
	CSA, EC4, EC5

• Fish – scales, shells, gills, fins, camouflage • Reptilia and Amphibia – shells, scales, shedding, moist skin, camouflage • Invertebrate – exoskeleton, camouflage.	

6 Biological cells and tissues

6.1 The structure and function of biological cells.

What do learners need to learn?	Skills
Structure and function of mammalian cell components and organelles to include: • plasma/cell membrane • cytoplasm • nucleus (nucleolus, nuclear envelope, chromatin) • centrioles • microfilaments • mitochondria • Golgi apparatus • Rough Endoplasmic Reticulum (RER) • Smooth Endoplasmic Reticulum (SER) • ribosomes • lysosome • vacuoles • cilia. The structure and function of different cell types**:** • stem • bone • blood • muscle • fat • skin • nerve • endothelial • sex • pancreatic – hormone and enzyme production • cancer – abnormal mitosis and cell development. Function and mechanism of cellular processes, including how they interact: • active transport • passive transport • cell signalling • autophagy • cell movement • metabolism • homeostasis. Key differences between plant, animal, bacterial and fungal cells: • specialised cells – RBCS, neurons, spermatozoa, ova, neuron, osteocyte, fibroblast, erythrocyte, leucocyte, lymphocyte, adipose • prokaryotic • eukaryotic. Structure, function, location and identification of histological epithelial tissue	CSA, EC4, EC5

samples under a microscope: • squamous • columnar • ciliated columnar • cuboidal • glandular • transitional • pseudo stratified • stratified • simple. Structure, function, location and identification of histological connective tissue samples under a microscope: • basic structure (cells, fibres, ground matrix) • loose connective (adipose, areolar, reticular) • dense connective (regular, irregular, elastic) • specialised connective (blood, bone, cartilage). Structure, function, location and identification of muscle tissue: • skeletal (sliding filament theory, fast and slow twitch fibres) • smooth (circular and longitudinal) • cardiac (intercalated discs). Structure, function, location and identification of nervous tissue: • cell body • axon • dendrites • terminal endings • myelin sheath • Schwann cells • nodes of Ranvier • conduction of an action potential • structure of a synapse • neurotransmitters • structure of sensory, motor, relay • monosynaptic and polysynaptic reflex arcs.	

6.2 **Immunity** and **life stages**.

Range:
Immunity – Integumentary system, vaccinations, specific and non-specific, natural and acquired, cells involved in immunity.
Life stages – Neonate, juvenile, adult (working, breeding), senior, geriatric.

What do learners need to learn?	**Skills**
The function of the integumentary system as first line of defence for the immune system. How immunity changes over the life stages of animals and how it affects the way in which the immune system works:	CSA, EC4, EC5

- natural immunity, artificial immunity (acquired, active, passive)
- specific and non-specific immune system
- maternal antibodies and how they are acquired
- herd immunity
- the function of T-lymphocytes and B-lymphocytes.

The role and importance of vaccinations on managing the health and welfare of animals:

- primary and secondary vaccination
- boosters
- live/dead/attenuated vaccines.

The process of wound healing and how it is affected by the life stage of the animal:

- haemostasis, inflammation, proliferation, remodelling
- coagulation cascade pathway.

How organisms defend against disease, including:

- natural barriers – skin, mucous membranes, tears, mucous (including genital), stomach acid
- leukocytes – phagocytes, lymphocytes, neutrophils
- antibodies
- platelets.

7 Nutrition

7.1 **Types** and **sources** of **nutrients** for animals.

Range:
Types – Essential, non-essential, micro/macro.
Sources – Fresh, dried, live, raw, frozen, tinned, concentrates, roughage, forage.
Nutrients – Carbohydrates (soluble and insoluble (fibre)), lipids, proteins, water, vitamins and minerals.

What do learners need to learn?	**Skills**
The sources of nutrients and additional supplements to optimise health and welfare of animals. The role of enzymes in the processing of nutrients (anabolism, catabolism). The role of micro-organisms in the breakdown of nutrients. Structure of key nutrients: • Carbohydrates: o monosaccharides, disaccharides, polysaccharides o straight chain and ring structure of monosaccharides and condensation reactions to form 1–4 and 1–6 glycosidic bonds o combination of monosaccharides to produce common disaccharides, reducing and non-reducing sugars, structures of glycogen, amylase and amylopectin, polysaccharides, starch and cellulose o insoluble carbohydrates (fibre). • Proteins: o amino acids, peptides, proteins o common structure of an amino acid o condensation reactions to form peptide bonds o significance of the 'r' group and other functional groups o primary, secondary, tertiary and quaternary structures and use of hydrogen bonding and disulphide bridges in forming these structures o structure of fibrous and globular proteins and the results of denaturation. • Lipids: o triglycerides, fatty acids, cholesterol, phospholipids, waxes o structure of glycerol and fatty acids o formation of a triglyceride o structure of saturated and unsaturated fatty acids o naming of fatty acids upon both 'n' and omega o formation of phospholipids and their hydrophilic and hydrophobic properties o formation of ester bonds. Types and sources of nutrients required by omnivores, carnivores and herbivores.	CSA, EC4, EC5

Functions of major nutrients within an animal's body:

- Carbohydrates:
  - carbohydrates as energy stores
  - provision of fibre to maintain correct function of the large intestine
  - inputs for respiration
  - as structural components of animal and plant cells and tissues.
- Proteins:
  - inputs for respiration storage molecules
  - enzymes
  - transport molecules (within the cell, across membranes and between cells)
  - cell signalling molecules (hormones, receptors and signal transduction)
  - structural components of animal and plant cells and tissues.
- Lipids:
  - storage molecules
  - inputs for respiration structural components of animal and plant cells and tissues
  - insulation
  - protection (waterproofing)
  - buoyancy (blubber)
  - cell membranes
  - intercellular messengers (lipid-based hormones).
- Water:
  - role as a solvent
  - chemical reaction
  - thermoregulation
  - cohesive properties.

How digestion and absorption of the major nutrients happens:

- Biological digestion:
  - tissue layers of intestinal wall – mucosal ducts and glands, lymph, blood vessels, circular muscle layer, longitudinal muscle layer, serosa.
- Monogastric:
  - organs and accessory glands
  - dentition
  - enzymes
  - acid and alkaline secretions
  - absorption of nutrients and water
  - hindgut fermenters.
- Ruminants:
  - organs, stomach components, stomach
  - dentition
  - microbial organisms in fibre fermentation
  - partition of protein in the rumen.

The importance of micronutrients in relation to digestion and absorption:

- vitamin K

• taurine in cats • phosphorous and calcium.	

7.2 Causes, signs and treatment of **nutritional deficiencies** and **disorders** in animals.

Range:
Nutritional deficiencies – Protein, iron, calcium, vitamin A, vitamin C, vitamin D, hypovitaminosis.
Nutritional disorders – Malnutrition, anorexia, obesity, hyperparathyroidism, gastrointestinal illnesses, scurvy, rickets, diabetes, urolithiasis hypervitaminosis.

What do learners need to learn?	**Skills**
How nutrient and supplement requirements may change over different life stages/events: • neonate • juvenile • adult (working, breeding) • senior • geriatric • specialist veterinary diets • recuperation. How different nutrients, or the lack of, affect the health and welfare of animals: • growth • body condition • ability to perform (working and breeding animals) • coat/skin condition • behavioural impact • neurological health • resistance to external disease. The causes and signs of animal nutritional deficiencies and disorders. How animal nutritional deficiencies and disorders can be treated or managed: • veterinary intervention • medication • diet • supplements • lifestyle • movement.	CSA, CSB, CSC, CSD, EC4, EC5

8 Animal behaviour

8.1 Characteristics and causes of natural, atypical, desirable and undesirable behaviour for a **species**.

Range:
Species – Taxa groups (see Appendix 2).

What do learners need to learn?	**Skills**
Characteristics and causes of natural behaviour: • feeding (hunting, foraging, scavenging, ambush) • sleeping (hibernation, torpor) • mating/breeding • moving • interaction (social, grooming, courtship) • territorial behaviours • bodily functions • ecological niche (group interaction within habitat) • The five Fs – fright, flight, freeze, flirt, faint. Characteristics and causes of atypical behaviour: • stereotypic behaviours • displacement behaviour • excessive activity or inactivity • poor health. How to encourage natural (desirable) behaviour in animals: • environmental/behavioural enrichment • intraspecific/interspecific interactions. Characteristics of circadian behaviour. How poor welfare of animals affects behaviour: • inappropriate environment • inappropriate diet • ill health • lack of stimulation (mental and physical) • inappropriate social groupings • confinement. Definitions of: • diurnal • nocturnal • crepuscular. Environmental factors and how they impact behaviour: • seasons • altitude • lighting • climate • food availability • social interaction • pollution.	CSA, CSB, CSC, CSD, CSE, CSF, EC1, EC4, EC5

The part trophic levels play in behaviour.

The impact nutrition plays in behaviour and how it can influence management of behaviour and positive reinforcement in training.

The impact routines can have on behaviour:
- feeding
- sleeping
- activity.

Social needs of animals – nurture versus nature, wild versus captive.

How social needs affect behaviour and potential for learning during different life stages/events:
- imprinting
- juvenile
- adult (working, breeding)
- geriatric
- health status (obesity, anorexic, specialist veterinary diets recuperation).

The part pheromones and hormones play in behaviour.

Methods of communication used by animals including:
- Interspecific and intraspecific communication:
  - vision (body language, facial expressions)
  - hearing (vocalisations, other sounds)
  - chemical (smell, pheromones, taste)
  - touch (allogrooming).
- Social behaviours:
  - hierarchies
  - maintaining dominance relationships (communication methods used to reduce conflict)
  - agonistic behaviour
  - social bonding and affiliative behaviour
  - predator/prey behaviours (pack hunting)
  - altruism.

8.2 Behavioural studies, observations and use of data.

What do learners need to learn?	**Skills**
Reasons for studying behaviour: • improving captive animal management • managing animal populations • improving animal welfare. The contribution of noteworthy ethologists: • Darwin • Lorenz	CSA, CSB, CSC, CSD, CSE, CSF, EC1, EC4, EC5

- Tinbergen.

Observation sampling techniques and their application:

- focal
- behaviour
- *ad libitum*
- scan
- Interval.

Observation recording techniques and their application:

- continuous sampling versus time sampling
- fixed interval point recording
- one-zero recording.

The suitability of using observation methods:

- video cameras (camera traps, infra-red, camouflage, manually operated)
- *in situ* observation (binoculars, close contact, in hides, acclimatised/ desensitised)
- trackers (radio collars, microchips, tags, natural and artificial markings)
- Drones.

Sampling strategies:

- continuous
- instantaneous
- *ad-lib*.

Use of recording data:

- ethograms
- recording charts
- behaviour records to inform animal welfare decisions.

How data is used to provide information on behaviours and the health and wellbeing of animals.

How ethical boards are used to scrutinise the use of animals within research to prevent compromise of animal welfare.

How information is used to adapt human behaviour to influence desirable outcomes.

Guidance for delivery

A variety of active teaching and learning activities should be used to engage learners in this animal and management core pathway. Opportunities for visits/engagement with local industry and employers should be provided throughout the delivery of the content – where appropriate, local employers could present details of recent projects, problems faced and how they were overcome. Learners' work placement experiences could be presented to peers detailing where knowledge and skills within the content was seen in practice.

Formative assessment for the content may include verbal Q&A, presentations to peers, observation of stock control activities etc. Reinforcement of learning can be encouraged through revisiting learning, group discussions and the establishment of a peer support system within the cohort.

Providers must ensure content is delivered in line with current, up-to-date industry practices, which will require:

- current industry legislation, regulations and technical information.
- teaching coverage representing the type of equipment currently available and accepted for use in the UK industry.

Suggested learning resources

Books

Advanced Biology (The Advanced Series Second Edition), Kent M, (2013), 2nd Edition
Published by: OUP Oxford
Advanced Chemistry (The Advanced Series Second Edition), Clugston M, Flemming R, (2013), 2nd Edition
Published by: OUP Oxford
A-Level Business Studies: Knowledge Practice Workbook AQA: 100 questions + Answers, Resources P, (2023)
Published by: Independently published
Animal Nutrition, Macdonald P, Greenhalgh JFD et al, (2022), 8th Edition
Published by: Pearson
An Introduction to Animal Behaviour, Manning A, Dawkins MS, (2012), 6th Edition
Published by: Cambridge University Press
Animal Behaviour, Alcock J, (2013), 10th Edition
Published by: Sinauer
Animal Physiology, Hill W, Cavanaugh DJ et al, (2022), International 5th Edition
Published by: OUP USA
Animal Training: Successful Animal Management Through Positive Reinforcement, Ramirez K, (2019)
Published by: First Stone Publishing
Animal Welfare, Appleby MC, Olsson A et al, (2018), 3rd Edition
Published by: Cabi Publishing
Applied Veterinary Clinical Nutrition, Fascetti A, Delaney SJ et al, (2023)
Published by: Wiley Blackwell
Arthur's Veterinary Reproduction and Obstetrics, Noakes DE, Parkinson TJ et al, (2018), 10th Edition
Published by: Saunders
Aspinall's Complete textbook of Veterinary Nursing, Lakeman N, Aspinall V, (2016), 3rd Edition

Published by: Elsevier
Basic Animal Feeding and Nutrition, Pond WG, Church DC et al, (2004), 5th Edition
Published by: Wiley
Behavior of Exotic Pets, Tynes VV, (2010)
Published by: Wiley-Blackwell
Biology: How Life Works (International Edition), Morris J, Hartl D et al, (2019), 3rd Edition
Published by: W H Freeman
Biosecurity in Animal Production and Veterinary Medicine: From principles to practice, Dewulf J, Immerseel FV, (2020)
Published by: CABI Publishing
Biosecurity: Understanding, Assessing, and Preventing the Threat, Burnette R, (2013)
Published by: Wiley
Book Vet Tech, Parks SQS, (2020)
Published by: Independently published
BSAVA Textbook of Veterinary Nursing (BSAVA British Small Animal Veterinary Association), Cooper B, Mullineaux E et al, (2020), 6th Edition
Published by: BSAVA.
Canine And Feline Nutrition and Dietetics – A guide for the general practitioner, Guidi D, (2020)
Published by: Edra Publishing
Canine and Feline Nutrition: A Resource for Companion Animal Professionals, Case L, Daristotle L et al, (2010), 3rd Edition
Published by: Mosby
Chemistry: 15 (Macmillan Foundations Series), Lewis R, Evans W, (2018), 5th Edition
Published by: Red Globe Press
Cognition, Evolution, and Behavior, Shettleworth S, (2009), 2nd Edition
Published by: Oxford University Press
Color Atlas of Veterinary Histology, Bacha JB, Bacha LM, (2012), 3rd Edition
Published by: Wiley-Blackwell
Companion Animal Care and Welfare: The UFAW Companion Animal Handbook (UFAW Animal Welfare), Yates J, (2019)
Published by: Wiley Blackwell
Companion Animal Nutrition: A Manual for Veterinary Nurses and Technicians, Ackerman N, (2008)
Published by: Butterworth-Heinemann
Comparative Anatomy of the Vertebrates, Kent GC, Carr RK, (2000), 9th Edition
Published by: McGraw-Hill Higher Education
Concise Review of Veterinary Microbiology, Quinn PJ, Markey BK et al, (2015), 2nd Edition
Published by: Wiley Blackwell Publishing
Cunningham's Textbook of Veterinary Physiology, Bradely T, Klein G, (2019), 6th Edition
Published by: Saunders
Dictionary of Animal Behaviour (Oxford Paperback Reference), McFarland D, (2014), 2nd Edition
Published by: Oxford University Press
Farmwise – Your Essential Guide to Health and Safety in Agriculture, (2017), 3rd Edition
Published by: HSE
Functional Anatomy and Physiology of Domestic Animals, Reece WO, Rowe EW, (2009), 5th Edition
Published by: Wiley-Blackwell
Fundamentals of Applied Animal Nutrition, Dryden G, (2021)

Published by: CABI
Health & Safety at Work Essentials, Freeths LLP, 2022, 9th Edition
Published by: Lawpack Publishing Ltd
Health and Safety at Work: An Essential Guide for Managers, Stranks, J, (2019), 10th Edition
Published by: Kogan Page
Introduction to Health and Safety at Work: for the NEBOSH National General Certificate in Occupational Health and Safety, Hughes P, Ferrett E, (2020), 7th Edition
Published by: Routledge
Introduction to Veterinary Anatomy and Physiology, Aspinall V, Cappello M, (2020), 4th Edition
Published by: Elsevier Saunders
Life: The Science of Biology (International Edition), Hillis D, Heller H et al, (2020), 12th Edition
Published by: W H Freeman
Measuring Behaviour: An Introductory Guide, Martin P, Bateson P, (2021), 4th Edition
Published by: Cambridge
Microbiology For Dummies, Stearns J, Surette M, (2019), 1st Edition
Published by: For Dummies
Occupational Health and Safety Management: A Practical Approach, Reese CD, (2017), 3rd Edition
Published by: CRC Press
Second Nature: Environmental Enrichment for Captive Animals (Zoo and Aquarium Biology and Conservation Series), Shepherdson DJ, Mellen JD et al, (1999)
Published by: Smithsonian Books
Supply Chain Management: Strategy, Planning, and Operation, Chopra S, (2019), 7th Edition
Published by: Pearson
The Dissection of Vertebrates, De Iulii G, Pulerà D, (2019), 3rd Edition
Published by: Academic Press Inc.
The Ethology of Domestic Animals: An Introductory Text, Jensen P, (2017)
Published by: CABI Publishing
The Sixth Extinction: An Unnatural History, Kolbert E, (2014)
Published by: Henry Holt and Company
Understanding Cat Behaviour, Roberts G, (2014)
Published by: CreateSpace Independent Publishing Platform
Veterinary Anatomy Coloring Book, Saunders, (2015), 2nd Edition
Published by: Saunders
Veterinary Anatomy Coloring Book: Animal Anatomy and Veterinary Physiology Coloring
Veterinary Infection Prevention and Control, Caveney L, Jones B et al, (2011)
Published by: Wiley-Blackwell
Veterinary Practice Management: A Practical Guide, Shilcock M, Stutchfield G, (2003), 2nd Edition
Published by: Saunders
Zoo Animals Behaviour Management and Welfare, Hosey G, Melfi V, (2013), 2nd Edition
Published by: Oxford University Press
Zoo Animal Learning and Training, Melfi VA, Dory N et al, (2020), 1st Edition
Published by: Wiley-Blackwell

Websites

Animal Welfare Journal – UFAW
www.ufaw.org.uk/the-ufaw-journal/animal-welfare
Companion Animal Behaviour Therapy Study Group
www.cabtsg.org
Ethical Consumer
www.ethicalconsumer.org
Friends of the Earth
https://friendsoftheearth.uk/
Gov.uk: Animal by-products categories, site approval, hygiene and disposal
www.gov.uk/guidance/animal-by-product-categories-site-approval-hygiene-and-disposal
Guidance on the classification and assessment of waste (1st Edition v1.2.GB)
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1021051/Waste_classification_technical_guidance_WM3.pdf
Health and Safety Executive (HSE)
www.hse.gov.uk
Journal of Animal Physiology and Nutrition
https://onlinelibrary.wiley.com/journal/14390396
Safety Culture
www.safetyculture.com
The Animal Behaviour Society
https://www.animalbehaviorsociety.org/web/index.php
The Association for the Study of Animal Behaviour
https://www.asab.org/
The Controlled Waste (England and Wales) Regulations 2012
https://www.legislation.gov.uk/uksi/2012/811/schedule/1/made
The Environment Agency (2001). Towards sustainable agricultural waste management
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291600/geho0003bieo-e-e.pdf
UK legislation
www.legislation.gov.uk
UN Sustainable Development Goals
http://www.undp.org/sustainable-development-goals
Waste Framework Directive (2023)
Waste Framework directive (2023) https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en
Waste Management and Climate Change. *Local Environment* Paper
http://www.frankackerman.com/publications/wasterecycling/Waste_Management_Climate_Change.pdf

407 Animal Management and Behaviour

Level:	3
GLH:	970
Assessment method:	Synoptic assignment Research project

What is this Occupational Specialism about?

The purpose of this specialism is for learners to know and undertake designing and development processes within animal management and behaviour.

Learners will have the opportunity to plan, perform and evaluate their work, utilising a range of techniques, methods and resources.

Learners will develop their knowledge and understanding of and skills in:

- optimising the health and welfare of animals
- the impact the environment can have on animals and how it can best optimised
- optimising animal health and welfare
- applying techniques to influence animal behaviour positively.

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

- What different methods can be used to optimise animal health and welfare?
- What do animal handlers do daily?
- What areas of the animal management industry could I work in?

Performance Outcomes

On completion of this specialism, learners will understand and be able to:

1. optimise health and welfare of animals
2. optimise animal environments to meet their needs
3. apply techniques to influence positive animal behaviour
4. provide information researched on an animal to promote animal welfare and conservation.

Completion of this specialism will give learners the opportunity to develop their maths, English and digital skills. Details are presented at the end of the specification.

Specialism content

Performance outcome 1

Occupational Specialism: Animal Management and Behaviour

1. Optimise health and welfare of animals

Learners must learn about a range of mammals, birds, herptiles, aquatics and invertebrates through the knowledge. They must demonstrate their skills of working with a mammal and one of the following types of animals – bird, reptile, amphibian, invertebrates.

Health, safety and the environment

1.1 **Policies** and **procedures** to be considered when managing animals in different **organisations**.

Range:

Policies and procedures – Lone working, animal welfare (feeding, preventative care, husbandry), health and safety, manual handling, fire and evacuation procedures, risk assessments, employee health, standard operating procedures.

Organisations (animal collection) – Zoos, pet stores, boarding establishments, grooming salons, rescue centres, wildlife centres, veterinary practice, community farms, research facilities, training centres.

What do learners need to learn?	Skills
The principles of safe working in animal management: • safe manual handling • risk assessments • lone working • personal protective equipment • animal restraint techniques. How organisational policies and procedures are designed to comply with current legislation including animal welfare and health and safety legislation. How to ensure staff are aware of the organisation policies and safe working practices (induction process, risk assessments, staff training). The implications of not following policies and procedures: • employer (fines, prosecution, damage to public perception, reputational damage, neglect of duty of care to animal) • employee (risk to safety, health and welfare, potential injury, neglect of duty of care to animal, loss of job) • animals (risk to safety, health and welfare, potential injury, neglect of duty of care to animal).	CSC, CSD, CSE, CSF, EC1, EC6

1.2 **Hazards, risks and control measures** associated with animal management.

Range:

Hazards – Lone working, hazardous materials, chemicals (disinfectant, cleaning materials), machinery, equipment, animals, animal behaviour, biohazards, working at height, electricity, toxins, zoonosis, notifiable diseases, radiation, anaesthetic gases, extreme temperatures, weather conditions, location (accommodation design, distance from others, distance from amenities), allergies.

Risks – Crushing, kicking, biting, contamination or asphyxiation by hazardous materials, contact with machinery and equipment, slips, trips and falls, drowning, electrocution, disease.

Control measures – Agreed contact times, carrying mobile phone/radio, carry out a risk assessment, ensure awareness of location of work, ensure awareness of expected time of return, biosecurity, security, vaccination of animals, vaccination of humans, animal isolation, appropriate handling and restraint techniques and equipment, personal hygiene, safe means of access, personal protective equipment (PPE), safe use of equipment, guarding of machinery and equipment, safe stop procedures followed.

What do learners need to learn?	**Skills**
Hazards and risks associated with optimising health and welfare of animals: • identification of associated risks when working with animals and the environment (direct contact with animals, toxicity, injury, death) • assessing risk rating pre and post control measures • organisational and personal control measures used to manage and minimise risks. The purpose, use and importance of risk assessments and method statements and their typical formats and content: • lone working • Control of Substances Hazardous to Health Regulations (COSHH) • product data sheets • species specific • environment. The reasons for use of risk assessments and method statements and consequences of non-compliance. The key risk factors associated with zoonosis and common zoonotic diseases: • transmission method (spread, severity) • exposure to the affected animal • lowered immune system • influence of incubation period • anthroponotic. Management of the spread, prevention and control of zoonotic diseases: • infection controls • disinfectant (dilution, contact time, disposal) • quarantine • PPE • isolation protocols.	CSA, CSB, CSC, CSD, CSE, CSF, EC1, EC2, EC3, EC4, EC5, EC6, DC2, DC3

Animal biology

1.3 Comparative anatomy and physiology of taxa.

What do learners need to learn?	**Skills**

The comparative anatomy and physiology of different bodily systems and key adaptations of different taxa including:
• Digestive systems (ruminant, monogastric, modified monogastric, digastric):
  ○ teeth/mouth (hypsodont, brachydont)
  ○ oesophagus
  ○ stomach
  ○ caecum colon
  ○ cloaca.
• Health issues connected with the digestive system (diet deficiencies, teeth issues).
• Reproductive:
  ○ uterus
  ○ cervix
  ○ parthenogenesis
  ○ gestation (precocious, altricial)
  ○ ovarian cycle (seasonal/non seasonal, mono oestrus, poly oestrus)
  ○ viviparous, oviparous, ovoviviparous, marsupial.
• Health issues with the reproductive system (hormonal problems, behavioural, breeding/fertility problems).
• Respiratory:
  ○ nasal cavity:
  ▪ lungs, air sacks, gills, spiracles
  ▪ cutaneous respiration
  ▪ aerobic and anaerobic systems
  ▪ physical exertion (high altitude, diving, sprinting).
• Health issues connected to the respiratory system (pathogens, brachycephalic).
• Cardiovascular:
  ○ open and closed circulation
  ○ heart (two, three, four chambers)
  ○ blood (red blood cells, oxygen capacity, haemolymph).
• Health issues connected with the cardiovascular system (heart disease, anaemia).
• Central nervous systems:
  ○ brain (optic centre, olfactory lobe)
  ○ echolocation
  ○ sight (monocular, binocular, blind, scotopic vision, photopic)
  ○ hearing (pinna, sensitivity to locate prey)
  ○ taste (taste buds, sensitivity, placement, tongue, vomeronasal organ)
  ○ smell (receptors, shape, nasal aperture)
  ○ touch (skin, feathers, scales, vibrissae, antennae, fur).
	EC4, EC5

• Health issues connected with the central nervous system (cataract conjunctivitis, otitis, age related).	

1.4 Identification of species using **Linnaean classification** and how this impacts animal management.

Range:

Linnaean classification – Kingdom, phylum, class, order, family, genus and species.

What do learners need to learn?	**Skills**
The importance of the classification of taxa in animal management: • to identify a range of animals, including their scientific names • physical traits within the classes of the animalia kingdom (mammalia, reptilia, amphibia, ava, invertebrate (arthropoda and mollusca), fish) • the species-specific natural environment. How physical traits and natural environment impact the care of the animal. The importance of using the correct classification system when reporting and recording information and data. The implications of recording inaccurate information and data: • animal health • animal welfare.	EC4, EC5

1.5 Actions taken to manage **notifiable** and **zoonotic diseases**.

Range:

Notifiable diseases – (relevant to species – Appendix 2): Rabies, Tuberculosis, Bluetongue, Foot and Mouth, Avian Flu, Swine Flu, Bovine Spongiform Encephalopathy (BSE), Newcastle Disease.

Zoonotic diseases – (relevant to species): Ringworm, Salmonella, Campylobacter, Leptospirosis, Lyme Disease, Sarcoptic mange, Toxoplasmosis, Bartonellosis, Psittacosis, Cheyletiella, Sarcoptic mange, Anthrax.

What do learners need to learn?	**Skills**
The causes, symptoms and routes of transmission of notifiable and zoonotic diseases. The implications of notifiable and zoonotic diseases on animal health and welfare: • unable to meet the five welfare needs. The process involved with reporting and managing notifiable and zoonotic diseases: • the role of the Animal and Plant Health Organisation (APHA) and Department for Environment, Food & Rural Affairs (DEFRA) in identifying and confirming a notifiable disease and assessing the risk of outbreak	EC1, EC3, EC4, EC5

- the involvement of a veterinary surgeon in identifying and confirming a notifiable/zoonotic disease
- the relevant biosecurity procedures.

Methods to manage and prevent the spread of notifiable and zoonotic diseases:

- management of wild populations (rats/rodents, badgers, rabbits, foxes, reservoir hosts)
- isolation, quarantine
- barrier nursing
- PPE
- biosecurity measures
- restricted access
- appropriate treatment/culling/euthanasia of affected animals
- disposal of waste/medication/carcass/cadaver.

1.6 **Factors** that affect natural and atypical **behaviour** in animals.

Range:

Factors – Lifecycles, ecological niche, breeding, environmental factors, training, co-operative care, health status, life stage (neonate, juvenile, adult (working, breeding), senior, geriatric) breeds (temperament, original purpose and impact on behaviour) animal instinct.

Behaviours – Eating habits, sleeping habits, social behaviour (social/solitary, play, relaxed), communication (aggression, fear, anxious, submissive, stressed, dominance), stereotypical, hunting, stalking, foraging, grazing.

What do learners need to learn?

Recognise differences between natural and atypical behaviour in animals.

Factors that influence the natural behaviour of different types of animals and how the knowledge of natural behaviour can influence:

- optimising animal health
- optimising animal welfare
- support breeding
- accommodation design
- appropriate enrichment provision
- requirements of relevant legislation.

The difference between the behaviour of an animal in the wild and its domestic or captive counterpart.

The underlying causes of atypical behaviour in animals:

- confinement
- unsuitable environment
- inappropriate social grouping
- human-animal interaction
- poor health.

Skills

EC4, EC5

1.7 **Nutritional requirements** to optimise the health and welfare of animal **species** according to **life stage** requirements.

Range:

Nutritional requirements:

Nutrients – Protein, Carbohydrates (soluble and insoluble (fibre)), vitamins (fat soluble and water soluble) and minerals (macrominerals and trace elements), lipids, water.

Ingredients – Seeds, roots, grasses, legumes, grains, fruits and vegetables, meat, insects, supplements, additives, preservatives.

Species – Mammals, invertebrates, birds, reptiles, amphibians, aquatics.

Life stages – Neonate, juvenile, adult (working, breeding), senior, geriatric.

What do learners need to learn?	**Skills**
The function of nutrients required by animal species and how the requirements may change during: • different life stages • seasons • environmental factors • health and welfare (deficiency, nutritional disorders, recovery from illness). The reasons for additional supplements for different species and life stages: • salt and mineral • natural additions (cuttlefish) • vitamin D3 • calcium • phosphorus. The requirements of food safety legislations when producing, preparing and storing feed (Animal Welfare Act 2006, Animal and Plant Health Agency (APHA), UK Pet Food (formerly known as PFMA). The different types of diet (nutrients, ingredients) and feed preparation available for animals based on the animals natural feeding behaviours, to include the advantages and disadvantages: • live (invertebrates) • commercially prepared (raw, tinned, dry, semi moist, concentrates) • home produced fresh/natural (forage, vegetables, fruit, herbs, pulses, seeds). Advantages and disadvantages of different methods used to prepare and present food, water and additional supplements to animals to encourage natural behaviours and maintain health: • bowl • slow feeders • scatter fed • enrichment • timed feeders • portion size • frequency of feed.	EC4, EC5

The use of food storage methods to minimise contamination and maintain animal health: • storage containers • temperature • humidity • security • stock rotation • location (prevent damp and vermin).	

Animal welfare

1.8 Animal welfare **frameworks** and **legislation and regulation**.

Range:

Frameworks – Secretary of State's Standards of modern zoo practice.

Legislation and regulation – Animal Welfare Act 2006, Zoo Licensing Act 1981, Wildlife and Countryside Act 1981, The Convention on International Trade in Endangered Species of Wild Flora and Fauna, Control of Trade in Endangered Species (Enforcement) Regulation 1997, The Animal Welfare and Invasive Non-native Species (Amendment etc) (EU Exit) Regulations 2020, The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018, Dangerous Dogs Act 1991.

What do learners need to learn?	**Skills**
The aims, purpose and application of animal welfare frameworks, legislation, regulation and codes of practice (including needs and domains) and the implications for animal management: • the need for a suitable environment (size of accommodation, enrichment, visual barriers, maintenance of accommodation, location) • the need for a suitable diet (type, frequency, suitability) • the need to be housed with or apart from other animals (solitary, social, human companionship) • the need to be protected from pain, injury, suffering and disease (correct handling, vaccination, biosecurity) • the need to express natural behaviours (enrichment, human interaction, bonding). The importance of ensuring frameworks and legislation are implemented when maintaining and optimising the health and welfare of animals. Assessment of quality of life of the animal and end of life/euthanasia. The methods used for euthanasia/culling and animal welfare implications at end of life. Ethical considerations for euthanasia/culling. Implications to the health and welfare of animals of non-compliance with relevant frameworks and legislations: • animals' welfare (atypical/stereotypical behaviours) • health (illness and disease/zoonotic)	CSC, CSD, EC4, EC5

- fines/imprisonment/loss of licence/reputational damage
- loss of production.

1.9 Handling and restraint **equipment** and **PPE** used for animal management.

Range:
Equipment:
Avian – Net, towel, bag, gloves falconry equipment, gauntlet**,** swan bags.
Captive (zoo) and wild (non-domestic) animal – Handling equipment nets, gloves, catchpoles, crushes, push boards, the use of sedation in relation to handling and restraint, dart guns, blow darts, crates, snake hooks.
Domestic animals – Head collars, ropes, halters, leads, harnesses, muzzles, crushes, stocks, crush cages, dog catcher, cat grasper, cat restraint bags, gauntlet, carry boxes, crates, nose grips, towels, gloves, restraining tubes.
PPE – Gloves and gauntlets, eye protection, face masks, protective clothing, footwear.

What do learners need to learn?
Reasons for handling and restraining animals:

- veterinary examinations
- giving medication
- health assessment
- relocation
- sexing techniques
- accommodation maintenance.

Safety requirements of the handler including:

- appropriate use of the equipment
- management of animal behavioural signs (aggressive, nervousness, anxiety, ill health)
- observing and awareness of animal's response to movement
- recognition of limitation of handler's skill level and experience.

Techniques for safe and welfare-orientated handling of animals when capturing, handling and restraining animals:

- consistent and welfare-friendly handling and restraint
- appropriate methods to handle the animal (pick up/carry) to ensure the animal isn't harmed or exposed to a negative experience
- positioning of handler and animal to ensure secure, safe and effective restraint
- species appropriate methods of handing and restraint (size, thickness, v-grip to include animal temperaments).

Recognition and consideration of fight or flight response when ensuring the safe and effective handling of animals.

The key requirements of legislation relating to the handling and restraint of animals (Animal Welfare Act 2006, Veterinary Surgeons Act 1966, Control of Dogs Order 1992).

Skills
CSD, EC4, EC5

The importance of ensuring animal welfare needs are adhered to when handing and restraining animals to minimise stress and disruption.	

1.10 **Techniques** used to identify animals.

Range:
Techniques – Rings, markings, flipper bands, identification chips, ear tags, fur clippings, identification charts, radio collaring, freeze branding, collars and tags.

What do learners need to learn?	**Skills**
The key advantages and the reasons for different animal identification techniques: • sex determination • welfare of animals • breeding of animals • population control • accountability of individual responsible for the animal • up-to-date record keeping. The suitability of using the different identification techniques according to the animal species (avian, domestic, captive and wild) and the impact (potential adverse effect) of these techniques on animal health and welfare. The key requirements of legislation relating to the identification of animals: • Microchipping of Cats and Dogs (England) Regulation 2023 • Control of Dogs Order 1992 • Dangerous Wild Animals Act 1976 • Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018 • Zoo Licensing Act (1981). The consequences of legislation for the identification of animals not being adhered to: • animals' welfare • health (illness and disease/zoonotic) • fines/imprisonment/loss of licence/reputational damage • loss of animal.	CSD, EC4, EC5

1.11 **Methods** of communication throughout different **life stages** of animals.

Range:
Methods – Auditory (vocalisations and other sounds), tactile (allogrooming), visual (body language, facial expressions), olfactory/chemical (smell, pheromones, taste).
Life stages – Neonate, juvenile, adult (working, breeding), senior, geriatric.

What do learners need to learn?	Skills
Key reasons for communication in animals throughout the life stages: • territorial • hunting • survival • courtship/breeding • social bonding. The range of social behaviour and communication in animals and the benefit to species survival: • interspecific • intraspecific • parent rearing • hierarchy • social bonding • affiliative behaviour • altruism • agonistic behaviour. Social needs of animals (social grouping, solitary, courtship) and how they may vary at different life stages. Ways in which natural social interactions can be met within a captive environment to provide appropriate social grouping: • monogamy • polyandry • polygamy • parental care • solitary. How these social interactions affect the health, welfare and husbandry requirements of animals.	EC4, EC5

1.12 **Techniques** to identify, monitor, assess and record the health and welfare of animal species.

Range:
Techniques (species specific – Appendix 2) – Observation (physical, behavioural), health check (visual/physical) examination (head to tail), clinical tests (faecal/urine analysis), weighing, body condition score, temperature taking, gait/locomotion assessment, facial analysis (pain scoring), identification of parasites, feed and water intake, capillary refill time, colour of mucous membranes, respiration rate, pulse, egg production monitoring, water/PH quality, CCTV, record keeping.

What do learners need to learn?	Skills
Recognise the key signs of health and ill health using appropriate species-specific techniques and the normal parameters in a range of animal species and their life stage to identify signs of good and poor health. The tools, equipment and materials (handling/restraint equipment/ PPE)	CSB, CSD, EC3, EC4, EC5, MC2, DC1, DC2, DC3

required used during the health and welfare assessment of the animal (species-specific).

The physical, clinical and behavioural factors that affect health and welfare in animals according to life stage (neonate, juvenile, adult (working, breeding), senior, geriatric) to include:

- dietary
- parasites
- pathogens
- stress/mental wellbeing
- accommodation
- metabolic conditions (diabetes, metabolic bone disease).

How the techniques are used to identify and monitor signs of animal health and their advantages and disadvantages in different environments.

The reasons for and suitability of different preventative health care techniques for different animals in different environments.

The ethical considerations associated with invasive and non-invasive health examination techniques.

The purpose of a husbandry plan in maintaining animal health and welfare.

How to develop and maintain a coherent and structured husbandry plan (daily, weekly, monthly, annual plan) in line with current animal legislation and regulation which includes:

- health and safety when working with the species and how it relates to the health and welfare of the animal.
- history of species and natural behaviours – domestication, natural behaviour, natural diet, natural environment
- ID sheets and social grouping (each individual identification, housing ratios, social or solitary)
- accommodation design – labelled diagram of accommodation, records of environmental parameters
- cleaning and maintenance schedules – how and when to clean, how and when to maintain
- feeding plan – feeding and watering, food presentation, dietary needs, average weekly feeding plan
- exercise and enrichment plan – type, frequency, quantity, environmental enrichment, average weekly plan
- handling and restraining records
- medical history, preventative care and health care plan – grooming needs, appropriate equipment, health checking and a list of possible common issues with the species, medical issues for the animal
- records of treatments and routine care (health checks, parasite treatment, medications, vaccinations)
- animal introduction procedures.

The importance of following a husbandry plan when monitoring animals and the consequences to the animal if a husbandry plan is not followed

accurately. The reasons for updating a husbandry plan and when this could change over time (daily, weekly, monthly, annual plan, due to life stage, disease or emergency situations, seasonality). Sensitivities and anthropomorphic perceptions of key stakeholders (owner, clients, scientists, members of the public visitors, veterinary professional) when carrying out health and welfare assessments on the animals.	

1.13 **Sampling techniques** used to support breeding, maintain health and maximise welfare in animals.

Range:

Sampling techniques:

Invasive – Blood withdrawal, vaginal swab, tissue collection, semen collection, saliva swabs.

Non-invasive – Urine collection, faecal collection, skin and scale scraping, feathers and fur plucking, sampling hard-shelled eggs (fertile/infertile).

What do learners need to learn?	**Skills**
The reasons for taking samples from animal species: • recognition of ectoparasites and endoparasites • welfare assessment • sexing • identifying diseases/disease conditions • identifying correct time for breeding. Sampling techniques for a health assessment including correct storage, hygiene or biosecurity and record keeping. Legislative exemptions for an unqualified professional individual (Veterinary Surgeon Act 1966 Section 3, Animal Welfare Act 2006).	EC4, EC5

1.14 Opportunities for animal **species** to be active in different **environments**.

Range:

Species – Mammals, invertebrates, birds, reptiles, amphibians, aquatics.

Environments – Zoos, wildlife parks, wildlife rescue/rehabilitation, pet shops, kennels, catteries, aviaries, birds of prey centres.

What do learners need to learn?	**Skills**
Opportunities to encourage activity in different animal species and how these can be applied in different environments: • accommodation (design, space, furnishings) • training (reinforcement, entertainment) • working (pastoral, guard, racing, service)	EC4, EC5

- enrichment (nutritional, social, behavioural, environmental)
- rehabilitation (non-invasive, design, space, furnishings).

How activity levels may vary according to the animal's needs:

- good or poor health (normal health, illness, arthritis, diabetes, obesity)
- breed restrictions (brachycephalic, congenital and hereditary conditions)
- species restrictions (wildlife, invasive, human-animal interaction)
- life stages (neonate, juvenile, adult (working, breeding), senior, geriatric).

The advantages of having suitable opportunities for animals to be active and the consequences of having inadequate activity.

The types of hazards that may be encountered through activities:

- health and safety of handler
- health and welfare of the animal
- equipment
- security of accommodation
- inappropriate habituation.

1.15 **Considerations** that affect the movement and transportation of animal species.

Range:
Considerations – Health and safety legislation/regulation, documentation, passports, animal health and welfare (life stages, pregnancy, physical problems (illness, injury, lameness), sexes, species specifics (social requirements, animal temperament, circadian rhythms (diurnal, crepuscular, nocturnal), use of a companion, stocking density), time of day, traffic, weather/seasons/temperature, duration, loading and offloading, type and suitability of transportation (paperwork, substrate, cleanliness, safety and security, biosecurity, humidity, lighting, temperature, ventilation), vehicle considerations (licence of driver, vehicle maintenance (MOT, tax, insurance, servicing), training of driver).

What do learners need to learn?
Key legislative, regulatory requirements and codes of practice when moving and transporting animals:

- The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018
- Animal Welfare Act 2006
- Welfare of Animals (Transport) Order 2006
- The Welfare of Animals at Market Order 1993
- The Veterinary Surgeons Act 1966
- The Welfare of Farmed Animals Regulations 2007
- The Welfare of Animals Regulations 1999 (slaughter or killing)
- Dangerous Wild Animals Act (1976)
- The Zoo Licensing Act 1981 (Amendment) (England and Wales) Regulations 2002
- Convention on International Trade in Endangered Species (CITES)

Skills
EC4, EC5

- Secretary of State's Standards of Modern Zoo Practice (SSSMZP).

The reasons for planning the movement and transport of animals from one location to another to include:

- exercise
- change of enclosure
- relocation
- market/slaughter
- breeding
- showing/competition
- medical reasons
- boarding.

Considerations for the most suitable approach to the movement and transportation of animals and the effects these have on animal health and welfare.

The importance of considering the ethical requirements of moving and transporting animals.

The types of handling equipment that might be required (carry cage, crate, collar, lead, basket, harness, halter, wagon, trailer).

The techniques used to minimise stress in animals during movement/ transportation:

- sedation
- training animals/staff
- necessary personnel available
- bird hoods
- environmental factors (temperature, light, familiar smells)
- appeasing pheromones.

How these techniques are applied and the effects these have on animal health and welfare.

1.16 Ethics of human-animal interaction.

What do learners need to learn?

How ethical theories impact on the human-animal relationship (research purposes, wild animals in captive environments, conservation, breeding):

- ethical theories: utilitarianism, animal rights, contractarianism, relational, respect for nature, consequentialism, animal sentience.

The opportunities and limitations of animal welfare needs when considering human-animal interaction in different environments (zoos, wildlife parks, pet shops, kennels, catteries, aviaries, birds of prey centres):

- the need for a suitable environment (size of accommodation, enrichment, visual barriers, maintenance of accommodation, location)
- the need for a suitable diet (type, frequency, suitability)
- the need to be housed with or apart from other animals (solitary,

Skills
EC4, EC5

social, human companionship) • the need to be protected from pain, injury, suffering and disease (correct handling, vaccination, biosecurity) • the need to express natural behaviours (enrichment, human interaction, bonding).	

1.17 Minor wound management and methods for administering medicines.

What do learners need to learn? Legal requirements of medical procedures that can be undertaken by non-qualified staff or a suitably qualified person (SQP) (Veterinary Surgeons Act 1966 Section 3, Veterinary Medicines Regulations 2013, Controlled Drugs, Animal Welfare Act 2006). The techniques and procedures for minor wound management: • cleaning of wounds (remove debris, discharge, foreign materials) • pressure to prevent bleeding • bandaging techniques (this may include foot, limb, ear/head, abdomen and tail) and the different layers that are used – primary layer, secondary layer and tertiary layer to include padding). The suitability of different veterinary medicine administration methods: • parenteral (injections – subcutaneous, intramuscular, intravenous, intraperitoneal) • enteral (oral, rectal) • parenteral topical (surface treatment, pour on (eye/ear/skin) • inhalational. The importance of keeping accurate records and monitoring animals with bandages and dressings: • maintaining cleanliness of dressing • preventing infection • preventing any adverse reactions (swollen legs/feet, sores).	**Skills** EC4, EC5

Relationship management, customer service, communication

1.18 **Data and information** for different **stakeholders**.

Range:

Data and information – Personal details, veterinary records, research data/outcomes, surveys/questionnaires, consent forms.

Stakeholders – Owner, internal and external customers, scientists, researchers, members of the public, visitors, veterinary professional, staff.

What do learners need to learn? Types of data and information created, retrieved, recorded and communicated for different types of stakeholders and purposes:	**Skills** EC4, EC5

- electronic/radio/television/social media
- leaflets/posters/presentations
- promotions and advertising
- qualitative and quantitative.

Procedures used to manage information and data:

- General Data Protection Regulation (GDPR)
- professional conduct and legislation
- security
- password protection
- social media restrictions.

Techniques used to interpret information and data:

- statistics
- analysis and evaluation
- graphs and charts
- research papers.

How information and data is used to organise schedules and prioritise tasks:

- time management
- Gantt charts
- timetables
- critical analysis.

Implications for misuse of data and information:

- non-compliance with legislation
- identity theft
- fraud
- inaccurate information being shared.
- public perception
- false advertising
- cyber security.

1.19 The **organisations** and stakeholders involved in animal management.

Range:
Organisations:

Local/Regional/National – Royal Society for the Prevention of Cruelty to Animals (RSPCA), Kennel Club, Government Council of Cat Fancy (GCCF), Royal College of Veterinary Surgeons, Royal Society for the Protection of Birds (RSPB), British Veterinary Association (BVA),The Animal Health Trust (AHT), The Blue Cross, People's Dispensary for Sick Animals (PDSA), Universities Federation for Animal Welfare (UFAW), Rare Breeds Survival Trust and breed societies, British and Irish Association of Zoos and Aquaria (BIAZA), Association of British and Irish Wild Animal Keepers (ABWAK), Scottish Society for Prevention of Cruelty to Animals.

International – World Society for the Protection of Animals (WSPA), International Fund for Animal Welfare (IFAW), The League Against Cruel Sports, People for the Ethical treatment of Animals

(PETA), Greenpeace, European Association of Zoos and Aquaria (EAZA), World Wide Fund for Nature (WWF), World Association of Zoos and Aquaria (WAZA).

What do learners need to learn?	Skills
The key local, regional, national and international organisations for different animal management sectors to include: • their mission • their main role in animal welfare and conservation • their rights and roles in relation to protecting and improving animal welfare • the impact these organisations have on animal care providers.	EC4, EC5

Skills

1.20 Using behaviour and body language to support interactions and communication.

What do learners need to demonstrate?	Skills
The effective use of body language and demonstrating appropriate behaviours for both humans and animals and how this can be applied to interactions and communication in different scenarios (environment, customer service, interaction between staff members, interspecies/intraspecies).	CSB, CSD, EC4, EC5

1.21 Application of suitable **equipment** for the restraint of animals.

Range:

Equipment:

Avian – Net, towel, bag, gloves, falconry equipment, gauntlet, swan bags.

Captive (zoo) and wild (non-domestic) animals – Handling equipment nets, gloves, catchpoles, crushes, push boards, crates, snake huts, snake hooks.

Domestic animals – Head collars, ropes, halters, leads, harnesses, muzzles, crushes, stocks, crush cages, dog catcher, cat grasper, cat restraint bags, gauntlet, carry boxes, crates, nose grips, towels, gloves, restraining tubes.

PPE – Gloves and gauntlets, eye protection, face masks, protective clothing, footwear.

What do learners need to demonstrate?	Skills
Minimise risks prior to handling and restraining an animal to ensure the health and safety of both the animal and the handler. Apply physical dexterity with appropriate pressure and delicacy when interacting with different animal species in different situations (moving animals, when preparing animals for transportation, health checks, giving medication/treatment, routine care), giving consideration to the animal's demeanour. Use of appropriate PPE, manual handling, animal restraining and handling techniques and operate restraining equipment.	CSD, EC5, DC2

Care taken when segregating social animals from within a group. Complete and accurately record animal information and data.	

1.22 Carry out a health assessment.

What do learners need to demonstrate?	**Skills**
Carry out animal health assessments using techniques appropriate to species and consideration for animal welfare needs. Prepare: • identify suitable PPE requirements, follow hygiene procedures (hand washing technique), ensure the health assessment area is fit for purpose for the mammal and animal. • check the record sheets for allocated mammal and animal (to identify any concerns recorded previously etc) • adhere to relevant health and safety processes ensuring all exits are closed to prevent any escape of the mammal and animal. • collect any required handling and restraint equipment • collect any required equipment for the health assessment e.g. weighing scales. Visual assessment: • correctly identify animal needed for assessment • assess animals' mobility and gait • monitor animals' behaviour • monitor animals' life signs (breathing) • check coat condition, external swelling, discharge. • check animals' accommodation for signs of illness (blood, vomit, diarrhoea). Handling and restraint for a health assessment: • lift animals (correct lifting procedure depending on animals' weight, temperament and behaviour) • fit restraint equipment or devices • restrain animals for a health check • manoeuvre animal body parts safely with consideration of animal emotion • handle and restrain the animal securely to move back to the original enclosure • place animals down safely into the original enclosure • monitor animals behaviour following handling. Move animal from one enclosure to another area: • capture and restrain animal within the original enclosure • lift animals (correct lifting procedure depending on animals' weight, temperament and behaviour) • restrain animal securely while moving to another enclosure • place animals down safely into the new enclosure/container.	CSA, CSB, CSC, CSD, EC1, MC1, MC2, DC1

Move animal within an enclosure: • select and use appropriate equipment (gates, boards, panels) to direct animals • secure animals for health assessment • use an animal's flight zone to create movement. Physical assessment: • measure pulse • determine animals' temperature • check animals' coat (skin, scales, fur, feathers) for signs of disrepair/damage/parasites/injury • check animals body parts (eyes, ears, nose, mouth, body legs, feet, genitals, anus) • measure animals (body condition score, weight). The appropriate use of different questioning techniques (open questions, probing questions) to obtain and clarify information on an animal. Complete and accurately record animal information and data regarding health assessment.	

Husbandry skills:

1.23 Administer treatment to an animal.

What do learners need to demonstrate?	**Skills**
Follow appropriate processes and procedures to administer treatment relevant to animal as instructed by the handler: • ensure cleanliness of the wound (remove discharge/debris) • apply a dressing and bandage to an animal's limb (foot, limb, ear/head, abdomen and tail) • apply topical medical treatments • apply oral medical treatments (tablets, syringe). Complete records once treatment has been administered.	CSC, CSD, EC4, EC5, MC1, DC2

1.24 Prepare, present and monitor feed for the animal using relevant **tools and equipment**.

Range:
Tools and equipment – Bucket, diet feeders, automatic water dispenser, trough, bowls, hay rack, ring feeders, enrichment devices, slow-feeders.

What do learners need to demonstrate?	**Skills**
Clean, sterilise and disinfect equipment used for feed and water. Inspect food items for signs of spoilage or disease.	CSC, CSD, MC1, MC2, MC5, MC6,

Calculate feed requirements as appropriate to the requirements of the animal. Measure (weight, size of the animal), weigh and prepare (chop, grate) food appropriate to the specific animal. Present food and water to the animal in the appropriate manner to encourage natural behaviour. Monitor and record food and water intake where possible to include the effect of the diet on animal health (body weight, condition, behaviour, coat condition, faecal quality, demeanour).	DC2, DC4

1.25 Apply preventative care techniques to support animal health and welfare.

What do learners need to demonstrate?	**Skills**
Preventative care using techniques and equipment as appropriate to species and consideration for animal health and welfare needs: • parasite control (methods, timings) • grooming (trimming, bathing/cleaning, brushing, check for parasites) • hoof/feet maintenance (nail/claw trimming).	CSC, CSD

1.26 Biosecurity **control measures** to prevent spread and containment of disease.

Range:
Control measures – Cleaning procedures, PPE, COSHH risk assessment.

What do learners need to demonstrate?	**Skills**
Minimise risks prior to applying biosecurity control measures to ensure the health and safety of both the animal and the handler. Clean and maintain equipment for use to include appropriate storage when not in use. Disinfect accommodation and fixtures and fitting to ensure accommodation hygiene and cleanliness. Application of biosecurity controls to prevent infection or spread of transfer: • hygiene (disinfectant, PPE) • correct use and dilution of cleaning products • avoiding cross-contamination (PPE, equipment, controlled access) • quarantine/isolation (inoculations) • preventative care (sustainable parasite control). Application of appropriate biosecurity **control measures** for different outbreak situations (infectious/non-infectious diseases, zoonotic, notifiable, ill animals).	CSC, CSD, EC4, EC5, MC1, MC2, MC3, MC4, MC5, DC4

Performance outcome 2

2. Optimise animal environments to meet their needs

Learners must develop knowledge about a range of mammals, birds, herptiles, aquatics and invertebrates. Learners are not required to demonstrate any skills working directly with animals for this performance outcome. Learners can monitor and determine animal needs and current behaviours through direct observation, a video, images, transcripts, reports or other formats. They can use the information from these sources to support decision making regarding the environment required for the animal. They must develop skills needed to optimise the environment to maximise animal welfare.

Knowledge

Health, safety and the environment

2.1 Effect of **accommodation** on biosecurity measures.

Range:
Accommodation – Kennels, catteries (chalets, penthouses) zoo animal enclosure, pens, hutches, vivarium, aviaries, aquariums/tanks, ventilated boxes, isolation enclosure (purpose built/temporary).

What do learners need to learn?	Skills
The aims and purpose of legislation relating to managing biosecurity controls when maintaining animal environments and accommodation (Animal Welfare Act 2006, Zoo Licensing Act 2002, Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018, RIDDOR 2013, COSHH 2002, Health and Safety at Work Act 1974, Animal Health Act 1981, Manual Handling, Zoonosis Order 1989). The factors informing organisational policies and procedures for cleaning and biosecurity: • legislation • species and accommodation requirements • staff availability and training • stocking densities. The factors that need to be considered when designing and maintaining animal accommodation to minimise and prevent disease spread: • ventilation • hygiene • humidity • temperature • stocking density • proximity of accommodation • barrier methods (physical, chemical) • security • drainage • waste disposal.	EC4, EC5, MC8

2.2 **Hazards**, **risks** and **control measures** associated when optimising animal environments.

Range:

Hazards – Machinery and tools, working at height, confined space, electricity, toxic plants, chemicals, zoonosis, extreme temperatures, weather conditions, location (animal, centre), lifting and moving.

Risks – Contamination or asphyxiation by hazardous materials, contact with machinery and equipment, slips, trips and falls, drowning, injury, electrocution, disease.

Control measures – Carrying mobile phone/radio, carry out a risk assessment, ensure awareness of location of work, biosecurity, vaccination of humans, personal hygiene, safe means of access, personal protective equipment (PPE), COSHH, following manufacturers' instructions, safe manual handling.

What do learners need to learn?	**Skills**
The typical hazards and risks associated when optimising animal environments. The organisational and personal control measures used to minimise and manage risks when working in the animal environment and accommodation.	EC4, EC5

2.3 Sustainable waste management **principles** in animal management **environments**.

Range:

Principles – Refuse, reduce, reuse, repurpose, recycle.

Environments – Pet shop, kennels, catteries, zoos/wildlife parks, veterinary practices, aquariums, rescue centres.

What do learners need to learn?	**Skills**
Key requirements of legislation relating to the management of waste disposal in animal environments (The Waste Management (England and Wales) Regulations 2006, Environmental Protection Act 1990, Controlled waste (England and Wales) Regulations 2012, COSHH 2002). The application of different waste management strategies and techniques used within a range of animal management environments: • hazardous waste (to include clinical) • non-hazardous waste (to include domestic/office) • offensive • storage methods prior to disposal • recyclable waste. The importance of sustainable waste management and recycling on the animal environment and wider environment. The implications to animals and humans of non-compliance with correct waste disposal techniques: • Animals:	EC4, EC5

- environmental impact
- animals' welfare
- health (illness and disease/zoonotic).

- Humans:
  - fines/imprisonment/loss of licence/reputational damage
  - loss of production
  - economical impact.

Animal biology

2.4 The physiological adaptations to meet environmental conditions.

What do learners need to learn?	**Skills**
How these physiological systems influence animal health and welfare, including diseases and disorders and environment requirements. • nervous systems (fright/flight/fight), special senses (sight, smell, auditory, vomeronasal, touch, skin and camouflage), heat stroke, hypothermia, hyperthermia • reproductive (pheromones, sexual organs, seasonal and non-seasonal breeders, hormones, dystocia, hyperoestrogenism) • digestive (feeding behaviours and categories, seasonal changes in diet, availability of food, nutritional deficiencies) • respiratory (oxygen affinity, altitude, low oxygen environment, aerobic and anaerobic respiration) • cardiovascular (adaptations to seasons/extreme temperatures, tachycardia, bradycardia).	EC4, EC5

2.5 How the natural **habitats** influence requirements for captive animal environments.

Range:
Habitats – Aquatic (marine/fresh), terrestrial (forest, grassland, desert, shoreline, coastal, wetlands), atmospheric, biomes.

What do learners need to learn?	**Skills**
The key requirements of legislation relating to the natural habitats of animals (Conservation (Natural Habitats) Regulations 1994, Environmental Protection Act 1990, Countryside and Rights of Way Act 2000 (Areas of Outstanding Natural Beauty), Wildlife and Countryside Act 1981, Sites of Special Scientific Interest). The natural habitats and environmental requirements of different animals and how the knowledge of the captive environment can be used to best optimise the animal welfare requirements: • humidity • temperature range for thermoregulation • pH • UV and lighting (Circadian rhythms)	EC4, EC5, MC8

- enrichment
- bedding
- noise level
- substrate
- location.

2.6 Encouraging natural **behaviour** within a captive environment.

Range:
Behaviour – Social (hierarchy, dominance, recessive, submissive), solitary, courtship, parental behaviour, typical, atypical, stereotypical.

What do learners need to learn?

How species specific (intraspecific, interspecific) environmental and behavioural adaptions (mimicking, camouflage, aquatic, arboreal, terrestrial, fossorial) can be used to encourage natural behaviour in a captive environment.

The strategies for managing and preventing the development of atypical behaviours:

- environmental/behavioural enrichment
- intraspecific/interspecific interactions.

Skills
EC4, EC5

Animal welfare

2.7 How the animal welfare **frameworks** promote animal health and welfare within the environment.

Range:
Frameworks – The Five Animal Needs, The Five Domains.

What do learners need to learn?

How the five animal needs and domains, legislation (The Animal Welfare Act 2006, Zoo Licensing Act 1981, Animal Welfare (licensing of activities involving animals) (England) Regulation 2018, Dangerous Wild Animals Act 1976) and codes of practice (species-specific) influence the development and provision of captive environments to maximise animal welfare.

The implications to animals and humans of non-compliance with the needs, domains, legislation and codes of practice:

- Animals:
  - animals' welfare (atypical/stereotypical behaviours)
  - health (illness and disease/zoonotic)
  - loss of production.
- Humans:
  - fines/imprisonment/loss of licence/reputational damage
  - economical impact.

Skills
EC4, EC5

2.8 The **methods** and **equipment** used for animal environment management.

Range:
Methods – Deep clean, spot clean, no clean.
Equipment – PPE, bucket, towels, disinfectant, mop, dustpan and brush, sponges, hosepipe, pressure washer, squeegee, sieve, nets, brushes, shovel, rake, wheelbarrow.

What do learners need to learn?	**Skills**

Managing the animal's environment:
• the types and purpose of PPE used when optimising animal environments
• timing for cleaning
• method of cleaning
• factors that affect cleaning procedure (breeding, ill health)
• factors that affect cleaning frequency
• public perception (pet shop, wildlife park, zoo)
• avoidance of cross-contamination (animal-human, human-animal, animal-animal)
• record keeping.
 	
Considerations for storage and maintenance of equipment for environment management:
• health and safety
• cleaning equipment and materials
• replenishing equipment and materials
• security of equipment and materials
• environmental conditions
• contamination (vermin, mould).
 	
Benefits and potential harms associated to animals and humans when managing the environments:
• Benefits:
  ○ animal/human health
  ○ animal welfare provision
  ○ appropriate security
  ○ appropriate behaviours.
• Potential harms:
  ○ disease, injury and contamination
  ○ behavioural impact
  ○ toxicity (inappropriate use of disinfectant/contaminated food or bedding).
	CSC, CSD, EC4, EC5

2.9 Methods of enrichment used within different animal environments to promote health and welfare.

What do learners need to learn?	**Skills**
The importance of the five categories of enrichment and how the enrichment is applied to different species, population size and accommodation requirements:	EC4, EC5

- environmental
- social
- cognitive
- sensory
- nutritional.

How enrichment within an environment can enhance animal health and welfare in a range of species:

- items and techniques that can be used to create enrichment
- enrichment evaluation (pre and post enrichment observation)
- health and safety/toxicity (animal and human)
- encouraging the display of natural behaviour.

Environment design

2.10 Factors affecting the **design** of animal accommodation and **environment**.

Range:
Design – Size (minimum guidelines), stocking densities and animal to staff ratios, social needs of animals, location, proximity to other species and sexes, life stages of animals (neonate, juvenile, adult (working, breeding), senior, geriatric), heath status of the animal (including isolation), opportunities for movement and exercise, purpose for which the animal is being kept, minimising fear and distress, provision of food and water, enrichment (places to hide, opportunities for exercise and exhibit natural behaviours), duration (short term/long term), animal safety (toxic plants, fire, sharp objects), security of animal accommodation (authorised/unauthorised access and escape), human safety (human-animal interactions and minimise unintentional contact), movement and handling of animals.
Environment – Humidity, ventilation, pollution, prevailing weather, temperature, UV provision, noise, drainage, waste disposal, cost, sustainability, resource availability, security of accommodation, biosecurity (biohazards), substrates, construction materials (components and furnishings), water quality, circadian rhythm.

What do learners need to learn?

The importance of animal welfare considerations regarding the design of the animal environment.

The environmental considerations (construction materials, maintenance and sustainability) regarding the design of the animal environment.

The impact of the accommodation design on:

- animal health and welfare including the impact of poor accommodation design
- stakeholders (owner, clients, staff, scientists/researchers, members of the public visitors, veterinary professional)
- animal locomotion and space available to enable the animals' natural behaviours.

Skills
EC4, EC5

2.11 Schematic design of animal accommodation.

What do learners need to learn?	Skills
Factors that contribute to design of accommodation: • calculation of scale • calculation of stocking density/space requirements • legislative requirements • costing • resource availability • environmental considerations • location of services • security • accessibility. Use of digital software (presentation software, word-processing software, design software) to create accommodation design to meet the requirements of animal health and welfare, to include: • title • key • annotations with labels • scale • three-dimensional provision and use of space.	EC4, EC5, MC1, MC2, MC3, MC7, MC9, DC1, DC2, DC4

2.12 Suitability of environments for different animals.

What do learners need to learn?	Skills
Techniques used to evaluate an animal environment (including enrichment) and its effect on animals: • behavioural observation/interactions • physical (health checks, injuries, death) • performance (reproductive, growth, loss of condition) • pathological changes (diseases, death).	EC4, EC5

2.13 Information and data relating to environmental design.

What do learners need to learn?	**Skills**
Types of data and information about the environment needed by different stakeholders (visitors, vets, employers, employees, owners, licensing officers, colleagues): • temperature • humidity • ventilation • stocking density • water quality • location • safety and security • entry and exit (visitors) • circadian rhythm • activity budget (accommodation uses indoor/outdoor) • cleanliness and hygiene. Methods of communication and record keeping used to inform stakeholders about the environmental provision (record cards, graphs, phone calls, health status, reports, databases, handover notes). The legislation and organisational procedures used to maintain the data security of the information collected.	EC4, EC5

Skills

2.14 Measure and record accommodation data and information.

What do learners need to demonstrate?	**Skills**
Usage of suitable equipment (thermometer, humidity gauge, UV meter, water quality tests, tape measure) to accurately measure and record accommodation data and information including: • monitor accommodation environmental conditions (temperature, humidity, ventilation, water quality, cleanliness, and hygiene) • measure the accommodation environment and calculate stocking density, animal to staff ratios or size to comply with minimum guideline to assess the suitability • measure resource needs and calculate costings (substrate, enrichment, bedding, cleaning materials, construction materials).	MC1, MC2, MC3, MC4, MC5, MC6, MC9, DC1, DC2, DC4

2.15 Cleaning an animal's enclosure.

What do learners need to demonstrate?	**Skills**
Cleaning an animal's enclosure to maintain and promote animal health and welfare and prevent disease and spread of disease. Processes involved in cleaning animal enclosure:	CSC, CSD, MC1, MC2, MC3, MC4, MC5, MC6, DC1, DC2,

• select and use appropriate PPE • assess accommodation to decide method of cleaning • collect relevant tools and equipment • use tools and equipment effectively to carry out tasks • remove enrichment materials (food and water receptacles, bed) • remove bedding/soiled bedding/waste (as appropriate to method of cleaning) • prepare, classify and dispose of waste following organisation policies and procedures • clean accommodation following the appropriate method of cleaning • dilute chemicals adhering to given ratios • disinfect accommodation areas as appropriate to method of cleaning (ensuring correct contact time for chemicals) • clean and disinfect food and water receptacles and enrichment equipment. • select and apply bedding or substrate as appropriate • replace food and water receptacles and enrichment equipment • select and install accommodation fixtures and fittings as appropriate to the animal species • sterilise equipment, clean and replace tools and materials for storage • ensure records are updated.	DC4

2.16 **Enrichment** in accommodation.

Range:
Enrichment: nutritional, social, behavioural, environmental.

What do learners need to demonstrate?	**Skills**
Create and install species-specific enrichment to promote animal health and welfare for different purposes. Monitoring and record keeping assessing any changes to animal behaviour before and after installation of enrichment within the accommodation.	CSC, CSD, EC5

2.17 Produce an accommodation design.

What do learners need to demonstrate?	**Skills**
Produce a digital design for animal accommodation. Assess an accommodation design for potential adverse effects on the animal: • suitability of size/space • location • social needs • enrichment • provision of food and water	MC1, MC2, MC3, MC4, MC8, DC1, DC2, DC4

- stocking density
- construction materials
- legislative requirements
- security
- accessibility
- environmental factors
- bedding and substrate.

Performance outcome 3

3. Apply techniques to influence positive animal behaviour

Learners must learn about a range of mammals, birds, herptiles, aquatics and invertebrates through the knowledge. They must demonstrate their skills of working with a mammal and one other type of animal.

Knowledge

Health and safety

3.1 **Organisational policies and procedures** when assessing animal behaviour.

Range:
Organisational policies and procedures – Lone working, animal welfare, health and safety, manual handling, fire and evacuation and procedures, risk assessment, employee health.

What do learners need to learn?	**Skills**
Key requirements of **organisational policies and procedures** when assessing animal behaviour to meet legislation and regulation: • Animal Welfare Act 2006 • The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018 • Dangerous Dogs Act 1991 • Dangerous Wild Animals Act 1976 • Zoo Licensing Act 1981 • Welfare of Farmed Animals (England) Regulations 2007 • Health and Safety at Work Act 1974 • Personal protective equipment at work regulations 1992 (amended 2002). Importance of dynamic risk assessments and method statements, typical formats and content, implications for use and non-compliance. Hazards, risks and control measures associated with influencing positive animal behaviour on a site-and species-specific basis: • tools and equipment (training devices, restraint and moving equipment) • activities undertaken (observation, behavioural assessment) • organisational and personal control measures used to manage risks and included in training plans • risks to humans when working with animals (animal species, unpredictable animal behaviour, inappropriate handling and restraint techniques, failure of restraint equipment). • potential impact on the welfare of animals. The importance and methods of communicating safety procedures and information to others on site.	EC4, EC5

Animal biology

3.2 How the nervous system influences animal behaviour of different **taxa**.

Range:
Taxa – Mammals, invertebrates, birds, reptiles, amphibians, aquatics.

What do learners need to learn?	**Skills**
The nervous system and key adaptations of different **taxa** to plan for and implement techniques to influence behaviour: • brain (size and complexity) • sensory detection (visual, auditory, olfactory, chemical, tactile) • special senses (echolocation, vibrissae, lateral line) • peripheral nervous system (reflex arc, voluntary responses) • autonomic nervous system (sympathetic and parasympathetic actions). Factors influencing human-animal interaction based on key adaptations of different **taxa**: • understanding of operant conditioning and use of positive reinforcement (cue, markers, rewards) • approach and safety • utilising animals for human benefit (service animals, performing animals).	EC4, EC5

3.3 Natural **behaviours** of animals during different **life stages**.

Range:
Behaviours – Eating habits, sleeping habits, social behaviour (social/solitary, play, relaxed), communication (aggression, fear, submissive, dominance), hunting, stalking, foraging, grazing.
Life stages – Neonate, juvenile, adult (working, breeding), senior, geriatric.

What do learners need to learn?	**Skills**
The development of species-specific behaviour at different life stages: • natural behaviour • atypical/stereotypical behaviour • innate behaviour • learned (trial and error, observed, social) • ecological niche (group interaction within habitat). How the animals' natural responses can be used to plan for and implement techniques to influence behaviour: • imprinting • innate behaviour (prey/predator behaviour) • reinforcement • fight or flight • mating behaviours.	EC4, EC5

Animal welfare

3.4 The influence of animal behaviour on welfare provision.

What do learners need to learn?	Skills
The key requirements of animal welfare frameworks (needs and domains) and legislation in relation in influencing animal behaviours. The reasons for studying animal behaviour: • improving captive animal management • managing animal populations (in-situ and ex-situ) • improving animal welfare. Utilising animal welfare frameworks when planning and implementing activities to influence behaviour: • human–animal • animal–animal • animal–environment. The implications to animal health welfare and behaviour of non-compliance with animal welfare frameworks: • diseases and disorders • stress/anxiety/fear • productivity • development of abnormal behaviour. The advantages and disadvantages of different techniques used to identify and record animal behaviour: • ethograms • video camera • *in situ* observation • instantaneous sampling • recording charts.	EC4, EC5

3.5 How pain, injury and disease influences animal behaviour.

What do learners need to learn?	Skills
The potential effect of diseases, pain and injury on behaviour: • pain response scoring • gait assessment • changes from normal behaviour (feeding habits, activity levels, allogrooming) • alterations to normal social interactions • stress behaviours (panting, licking, yawning, tail flicking, crouching, aggression) • displacement behaviours.	EC4, EC5

The impact of disease, pain and injury on the animal's response to training: • reluctance to interact • limited movement • aggression. The factors that would influence progressing with a behavioural training plan: • zoonotic diseases (isolation, disease control, pause training) • animal demonstrating indicators of pain, injury and disease • breeding. Positive and negative behavioural indicators of animal welfare when implementing activities to influence behaviour: • feeding habits • activity levels • play behaviour, socialising • grooming • reproductive • temperament.	

3.6 Methods of animal **handling and restraint equipment** used for animal training purposes.

Range:

Handling and restraint equipment:

Avian – Towel, gloves, falconry equipment, gauntlet, carry box.

Captive (non-domesticated) – Gloves, crushes, push boards, crates, restraining tubes.

Domestic animals – Head collars, ropes, halters, leads, harnesses, muzzles, crushes, carry boxes, crates, nose grips, towels, gloves.

What do learners need to learn?	**Skills** EC4, EC5
The appropriate PPE (gloves and gauntlets, eye protection, face masks, protective clothing, footwear) to use when restraining and handling animals, taking into account animals' behaviour. Plan for handling and restraining of selected animal species: • assess temperament • identify equipment to be used and size • assess if assistance is required • purpose of handling and restraining • welfare considerations • safe and correct handling techniques to include common restraint positions. The species-specific restraint equipment required to handle and restrain an animal in a positive manner. The most appropriate method of handling and restraint to use based on the animal's response/behaviour (aggression, illness, fear) and recognise when	

adaptations are necessary. The implications of not using correct methods or equipment when handling or restraining animals: • animal injury • human injury • animal welfare concerns • damage to equipment.	

3.7 Animal response to **internal and external factors**.

Range:

Internal factors – Hormones, pheromones, health status, hunger, thirst, life stage.

External factors – Temperature, weather, season, location, interspecies and intraspecies interactions, social grouping, accommodation, lighting, circadian rhythm.

What do learners need to learn?	**Skills**
Health, welfare, and behavioural indicators that an animal would be responsive to change: • internal factors • external factors. The importance of assessing an animal's responsiveness to internal and external factors and how this ensures animal welfare and encourages natural behaviour. Techniques used to assess an animal's responsiveness to the internal and external factors: • observation (change in interactions) • record keeping (health status, reproduction) • comparison of data (ethogram). Methods to encourage positive human-animal interactions: • handler behaviour • appropriate approach • managing the environment • appropriate training (animal and handler) • correct use of equipment.	CSC, CSD, EC4, EC5

Animal behaviour

3.8 Animal **behaviours** and their **characteristics**.

Range:
Behaviours – Natural, atypical, desirable, undesirable
Characteristics – Eating behaviour, predator/prey behaviour, social, temperament, reproductive behaviour, circadian rhythm, stereotypical behaviour.

What do learners need to learn?	**Skills**
Natural, atypical, desirable and undesirable behaviour in animals. The characteristics of different behaviours and the impact they may have on training plans. The causes of different behaviours of an animal: • diet and nutrients • environment • social and solitary • health • breeding status • life stage. Influences of the characteristics and causes of behaviour used to determine and monitor training plans.	EC4, EC5

3.9 **Methods** of keeping records of animal behaviours.

Range:
Methods – Ethogram, observation sampling techniques (focal, scan, ad libitum) timings (instantaneous, timed and continuous recordings), progress log.

What do learners need to learn?	**Skills**
The suitability of different methods to identify, monitor and record a range of animal training and behaviour. Monitoring how training is used to support behavioural change using suitable methods. The factors that impact the types of information gathered from recording animals' behaviour: • frequency of behaviours • duration of behaviours • interactions • reproductive behaviours (nesting, courtship, copulation, parturition, rearing) • activity • enclosure usage • natural, atypical, desirable, undesirable, stereotypical.	CSC, CSD, EC4, EC5

The uses of information gathered to support planning, evaluating and the impact of activities to influence behaviour. How information gathered can be used to plan, evaluate and enhance animals' natural behaviours: • enrichment • layout of accommodation • social interaction (breeding, reproduction) • training.	

3.10 The **impacts** of nutrition and feeding on behaviour.

Range:

Impacts (species-specific) – Type of nutrients (protein, carbohydrates, minerals, fats, vitamins), diet (balanced diet, dietary deficiencies).

What do learners need to learn?	**Skills**
The impact that nutrition and feeding can have on behaviour including: • life stage • animal health • temperament • social structures. How nutrition and feeding can be managed to positively influence and encourage natural behaviour: • presentation of food • timing of food and water intake • nutrients.	EC4, EC5

3.11 **Factors** influencing animals learning and behaviour.

Range:

Factors:

Environmental factors – Bedding, noise, humidity, temperature, pH, UV and lighting (circadian rhythms), enrichment, substrate, location, ventilation, hygiene, enclosure design and construction materials, stocking densities, life stage.

Communication – Posture, vocalisations, body language.

What do learners need to learn?	**Skills**
How to determine the suitability of an animal for training: • breed/species • age/life stage • temperament/natural responses/socialisation • health • activity levels.	CSC, CSD, EC3, EC4, EC5, DC1, DC2

How animal learning and behaviour is influenced both positively and negatively by:

- environmental factors
- health
- wellbeing
- social needs
- life stages
- communication methods.

How communication is used to monitor the response of animals to learning.

The steps required to develop and implement training plans based on an assessment of the suitability of the animal for training and the factors which influence animal behaviour:

- species
- breed
- history
- temperament
- health
- behaviour.

The importance of following a training plan and monitoring animals' responses to maximise success training and maintaining accurate record keeping.

Animal training

3.12 Suitability of **learning theories and training aids** for training **goals**.

Range:

Learning theory – Associative learning (classical and operant conditioning), higher learning (social or observational, latent and insight learning, cognition), non-associative learning (stimulus response), types of reinforcement (positive and negative), types of punishment (positive and negative), reinforcement schedules.

Training aids – Primary reinforcer, secondary reinforcers, chemicals (artificial pheromones), cues, markers (whistles, clickers, targets).

Goals – Shaping behaviour, desensitisation.

What do learners need to learn?	**Skills**
Suitable learning theories to meet a specific learning plan. The training aids to use to meet a specific learning plan. The suitability of learning theories to meet specific goals for different animals, how to determine these goals and the potential effects on the animal.	CSC, CSD, EC4, EC5

How learning plans are used to implement and monitor the effectiveness of the animal response to the training. Principles of the design of the learning environment and how these are applied to achieve specific objectives.	

3.13 Ethical considerations of training.

What do learners need to learn? The following terms in relation to animal training: choice, opportunity, control, aversive strategies, coercion, deprivation. The ethical considerations of training and human-animal interactions when using choice, opportunity, control, aversive strategies, coercion, deprivation, and the impact on animal welfare, learning and behaviour. The ethical considerations of the purpose of training for human benefit: • entertainment (sport, circus) • service and assistance • baiting/luring • capturing • animal health procedures (medical examination).	**Skills** EC4, EC5

Skills

3.14 Carrying out a behavioural assessment.

What do learners need to demonstrate? Differentiate between an animal's atypical and typical behaviours: • Observe the animals' behaviours. • Identify the influences of the animals' natural motivators on behaviour (food, social, bedding, enrichment). • Monitor and record animals' behaviour. • Interpret the findings of the behavioural assessment. • Recognition of signs of stress, stereotypical behaviours.	**Skills** CSA, CSC, CSD, EC4, EC5

3.15 Carry out a risk assessment when implementing a training programme.

What do learners need to demonstrate? Carry out a risk assessment for implementing a training programme to include: • potential hazards and health and safety risks • assessing risk rating pre- and post-control measures • apply control measures (location, biosecurity, handling and restraint methods, use of equipment, hygiene, safe access, PPE, safe stop	**Skills** CSB, CSC, CSD, EC1, EC3, EC4, EC5, DC1, DC3

procedures) • following organisational policies and procedures • monitor health and safety risks. • communicate risks.	

Training

3.16 Create a **training programme**.

Range:
Training programme – House training (urination and defecation, silence and jumping up), social referencing (socialisation, desensitisation and habituation), trick training (fetch, jump, balance), obedience training (lead work, sit, stay, down, leave and come), agility (flyball, agility courses), husbandry (stationing, box training, limb presentation).

What do learners need to demonstrate?	**Skills**
Assess an animal's suitability for training (species specific) and the potential training needs. Developing a training programme: • identification of training goals • identify suitable methods for training programmes • respond to animal behaviour and temperament • deliver positive reinforcement using precise and controlled movements • make appropriate use of personal space and movement • use training aids (cue, marker) safely and effectively • deliver appropriate tone, communication and body language. • deliver appropriate timing, frequency and duration of training. • make appropriate use of the animals fight and flight response and movement • use timelines to ensure reliability of successful training.	CSA, CSC, CSD, EC4, EC5

3.17 Evaluate animals' behaviour and responses to a training programme.

What do learners need to demonstrate?	**Skills**
Monitor and record the progress of the training programme to include: • suitable method of recording behaviour (ethogram) • adjusting the training programme to meet the required goals. • reviewing equipment • common training problems (inadvertent reinforcement, poor progress).	EC4, EC5, DC1, DC2

Performance outcome 4

4. Provide information researched on an animal to promote animal welfare and conservation.

For this performance outcome the expectation is that learners research an animal with which they are unfamiliar.

Knowledge

Animal biology

4.1 Evolution and **adaptations** of **animals** in conservation.

Range:

Adaptations – Physical, behavioural, and physiological.

Animal – Lion, tiger, Asian elephant, African elephant, white rhino, black rhino, giraffe, cheetah, amur leopard, clouded leopard, Bornean orangutan, Sumatran orangutan, chimpanzee, mountain gorilla, jaguar, big cats, herbivores, primates.

What do learners need to learn?	**Skills**
The types of evolution techniques within animal populations to include: • divergent • convergent • natural selection and adaptations (survival of the fittest) • speciation • parallel • co-evolution • five kingdoms • taxonomy • species classification (implications for animal care). The influence of evolution techniques on the conservation of animal. How knowledge of the natural history and adaptations of animals can be used in conservation to maximise animal management: • maintain animal populations • avoiding human-animal conflict • protecting animal habitats.	EC4, EC5

Animal welfare and conservation

4.2 Purpose of **legislation, regulations** and **frameworks** in supporting conservation.

Range:

Legislation and regulations – Animal Welfare Act 2006, Control of Trade in Endangered species regulation 2018 (COTES), The Zoo Licensing Act 1981 (Amendment) (England and Wales) Regulations 2002, The Wild Mammals (Protection) Act 1996, Wildlife and Countryside Act (1981), The Invasive Alien Species (Enforcement and Permitting) Order 2019.

Frameworks – Balai Directive, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Secretary of State Standard Modern Zoo Practice 2017, Berne Convention on the Conservation of European Wildlife and Natural Habitats, Convention on the Conservation of Migratory Species of Wild Animals (BONN), Species Survival Commission (SSC).

What do learners need to learn?	**Skills**
The role and requirements of legislation, regulation and frameworks in supporting and protecting animal health, welfare and conservation. Implications to animal health, welfare and conservation of non-compliance of legislation, regulation and frameworks: • change of risk status on IUCN Red List • loss of habitats • increase of illegal trade (exotic and pet trade, bush meat) • loss of biodiversity • pain, suffering, injury and disease to animals • loss of genetic diversity.	EC4, EC5

4.3 An **animal's** suitability for a **conservation programme**.

Range:

Conservation programme – Rescue, rehabilitation, release/relocation, breeding, culling, habitat restoration, anti-poaching patrol, community engagement/education**.**

Animal – Lion, tiger, Asian elephant, African elephant, white rhino, black rhino, giraffe, cheetah, amur leopard, clouded leopard, Bornean orangutan, Sumatran orangutan, chimpanzee, mountain gorilla, jaguar.

What do learners need to learn?	**Skills**
The reasons for conservation: • environmental (climate change, change in biodiversity) • human (habitat destruction, poaching, pet trade) • animal (health, disease, population, genetic pool). Assessing the individual animal's suitability to progress in a conservation programme: • health (good and poor) • welfare • behaviour.	EC4, EC5

4.4 Movement and transport of animals for **conservation activities**.

Range:
Conservation activities – Relocation, rescue, breeding, population management.

What do learners need to learn?	**Skills**
The key requirements of legislation and frameworks relating to the movement and transportation of animals in conservation: Legislation: • The Animal Welfare Act2006 • The Welfare of Animals Transport Order 2006 Frameworks: • Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) • International Air Transport Association (IATA) • The Control of Trade in Endangered Species (COTES) • Department for Environment Food and Rural Affairs (DEFRA). The principles of the movement and transportation of animals and how these are applied in conservation activities: • suitability of the animal • movement licences (border control) • suitability of transport and transport methods (containers) • suitability of movement methods (corrals, herding boards, sedation) • handling techniques • equipment.	EC4, EC5

4.5 Ethical considerations for conservation activities.

What do learners need to learn?	**Skills**
The ethics of human involvement in conservation activities. How to reintroduce predator species to ecosystems or considerations of reintroduction. The reasons for different methods of controlling population management of animals: • culling • neutering (chemical, surgical) • relocation • reintroduction of species to the ecosystem. Factors affecting decision making in rehabilitation of animals: • habituation and desensitisations • culling • spread of disease	EC4, EC5

- extent of injury affecting the animal's ability to survive in the wild.

Ethical concerns of the public in relation to conservation activities:

- risk to health and safety
- damage to property
- damage to business
- anthropomorphism.

How the actions of key stakeholders (conservation organisations) mitigate ethical concerns:

- education
- influencing legislation
- publicity
- social media.

4.6 **Organisations** in conservation and their **projects**.

Range:

Organisations – National: British and Irish Association of Zoos and Aquariums (BIAZA), Royal Society for the Protection of Birds (RSPB), Wildlife Trusts, Forestry Commission, National Trust, Rare Breed Survival Trust, Marine Conservation Society, Amphibian and Reptile Conservation Trust (ARC), Association of British and Irish Wild Animal Keepers (ABWAK).

International: European Association of Zoos and Aquariums (EAZA), International Union for Conservation of Nature (IUCN), Conservation Planning Specialist Group (CPSG), Worldwide Fund for Nature (WWF), Convention on International Trade in Endangered Species (CITES), UN Convention on Biological Diversity, World Association of Zoos and Aquariums (WAZA)

Projects – IUCN red listing, ZSLs Edge programme and Biodiversity Action Plan (BAPS), One Plan, Non-Government Organisations (NGOs), reintroduction programmes, relocation programmes, breeding programmes.

What do learners need to learn?

The role of zoos in supporting conservation of species (*in situ/ex situ*) and how this role has changed over time.

The role and purpose of national and international organisations in conserving species and their habitats.

The importance and methods of conserving rare breeds.

How projects facilitate conservation of species and habitats (*in situ/ex situ*).

Skills
EC4, EC5

4.7 **Methods** and **technologies** used to promote conservation of species, rare breeds and habitats.

Range:

Methods – Direct observation, genetic mapping, tracking, acoustic monitoring, surveying, data monitoring, embryo transfer, insemination (artificial/natural), cloning.

Technologies – Drones, GPS, geolocation, camera traps, identification chip, radio collars, satellites, acoustic sensors, banding, ringing.

What do learners need to learn?	**Skills**
Methods and technologies used to monitor, assess and improve the conservation status of species, rare breeds and habitats. How the methods and technologies are applied by key stakeholders (researchers, animal industry professionals, scientists, government representatives, vets, organisations). How these factors affect the need for conservation: • climate change/global warming • pollution • biodiversity and ecosystems • deforestation/human encroachment (loss of habitat) • poaching • hunting • human/animal conflict • culture/belief • reduction in status (the RED list) • invasive species • pet trade/exotic trade/exploitation • variability of gene pool. The effectiveness of methodologies for resolving conservation issues: • captive population management (same sex groups, breed to cull, breeding programmes) • anti-poaching strategies • education and awareness • reforestation efforts • increase in status (the RED list) • sustainability • legislations/border control • corridors/flyways. The impact conservation action has on the following considerations: • species survival • improved biodiversity • food production • human quality of life (positive/negative) • economy • land use/changes to environment.	EC4, EC5

4.8 The importance of genetics in conservation.

What do learners need to learn?	Skills
The importance of genetic diversity to support and enhance conservation. The consequences of hybridisation and inbreeding: • health status (immunity) • hereditary/congenital disease • fertility status (natality) • genetic variability • mortality • adaptability to the environment. The influence of selective breeding on population management and genetic diversity of rare breeds.	EC4, EC5

Research

4.9 The use of research to inform **stakeholders**.

Range:

Stakeholders – Researchers, technicians, animal keeper, breeding officers, scientists, government representatives, vets, animal welfare conservationists, *in situ* field researcher, behaviourists, industry consultants.

What do learners need to learn?	Skills
The role of animal research to improve conservation and habitat management. The principles of different types of research and how they could be applied in different research projects: • applied • basic • correlational • descriptive • ethnographic • experimental • exploratory. The suitability of different research methods and how they could be applied in different research projects: • primary • secondary • quantitative • qualitative • interviews • surveys/questionnaire/digital media • observations • experiments	EC4, EC5 MC7, MC8, MC10, DC4

- case study
- data analysis
- statistics
- mixed methods.

The principles of designing a research project:

- title
- aims and objectives
- hypothesis
- literature review (valid, reliable, credible, ethical, current)
- research plan (resources, timescales)
- risk assessment
- ethics
- methodologies
- recording of information
- analyse information and data
- conclusions/results
- references.

Techniques used to analyse and interpret information and data:

- graphs/charts
- tables
- identify patterns or trends.

The role of stakeholders involved in research and how their contribution benefits conservation:

- their information needs
- how the information needs are met.

How the research produced by stakeholders impacts the care and welfare of animals in captivity.

Consideration of the hazards, associated risks and implementation of control measures (organisational and personal) with undertaking primary research and presenting information to an audience.

Methods used to present information and data for different purposes and audiences:

- chart
- graph
- diagram
- peer review
- electronic presentation
- report
- verbal presentation
- publishing.

Skills

4.10 Steps to planning and proposing a research project.

What do learners need to demonstrate?	**Skills**
A logical approach to planning a research project which includes: Techniques to plan a project: • use a research action plan to break down a complex task into individual steps • sequence and prioritise steps • optimise work processes • allocate time and resources to steps • identify and develop search criteria, aims, objectives or questions to be answered • manage own time to achieve research objectives. Development of a research proposal: • carrying out a literature review of relevant information • validate information and data • assess suitability of information and data • identify and assess sources of information for reliability, validity, credibility, accuracy and currency. • record information • organise data into usable forms • input, process, manipulate and interrogate data digitally • create texts e.g. web page, report, abstracts • gather relevant information and data. • communicate and present information and ideas orally to others.	EC1, EC2, EC3, EC4. EC5 DC1, DC2, DC3, CSB

4.11 Steps to undertaking a research project.

What do learners need to demonstrate?	**Skills**
Analysis of research results and findings which develop on project aims and objectives: • interpret mathematical diagrams. Draw conclusions from research findings: • synthesis and summarise information and ideas • substantiate conclusions with evidence. • Evaluation of research findings.	EC1, EC2, EC3, EC4. EC5 DC1, DC2, DC3, CSB

4.12 Create and deliver a digital presentation.

What do learners need to demonstrate?	**Skills**
Create a presentation: • represent information and data using mathematical diagrams • create and edit digital media • use digital tools to engage an audience Deliver a presentation: • prepare to deliver a presentation about the research undertaken • convey technical information to different audiences e.g. technical and nontechnical • communicate and present information and ideas orally to others.	EC1, EC2, EC3, EC4. EC5 DC1, DC2, DC3, CSB

Guidance for delivery

The purpose of this specialism is for learners to know and undertake the theory and practice of Animal Management and Behaviour. A range of classroom-based and practical delivery methods should be used to ensure both theory and practice are delivered with strong linkage to vocational context. Centres are encouraged to introduce employers and specific professionals from the Animal Management and Behaviour industry to provide interesting and relevant information to the learner.

Throughout all practical tasks, the focus should be on safe working. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. Adequate Personal Protective Equipment (PPE), appropriate to the learner, the equipment and the task will be provided and worn in accordance with the associated risk assessment and policies and procedures. Learners should understand the importance of maintaining an awareness of current legislation and codes of practice. Thought should be put on the need for biosecurity and animal health and welfare measures throughout.

For the more theory-based outcomes it is anticipated that the delivery will be through formal lectures but it is recommended that they are linked directly with interactive lessons in a real environment and that visiting speakers are used where possible to provide a vocationally relevant context.

Wherever possible, it is expected that the learner is taught using methods and systems reflecting those used in a commercial-sized enterprise.

Suggested learning resources

Books

Animal Behaviour, Alcock J, (2013), 10th Edition
Published by: Sinauer
Animal Restraint for Veterinary Professionals, Sheldon CC, Topel J, (2023), 3rd Edition
Published by: Elsevier
Animal Training: Successful Animal Management Through Positive Reinforcement, Ramirez K, (2019)
Published by: First Stone Publishing
Animal Welfare, Appleby MC, Olsson A et al, (2018), 3rd Edition
Published by: Cabi Publishing
An Introduction to Animal Behaviour, Manning A, Dawkins MS, (2012), 6th Edition
Published by: Cambridge University Press
Behavior of Exotic Pets, Tynes VV, (2010)
Published by: Wiley-Blackwell
Behavioural Ecology; An Evolutionary Perspective on Behaviour, Danchin E, Giraldeua et al, (2008)
Published by: Oxford University Press
Cattery Design: The essential guide to creating your perfect cattery, Key D, (2006)
Published by: David Key Kennel and Cattery Design
Cognition, Evolution, and Behavior, Shettleworth S, (2009), 2nd Edition
Published by: Oxford University Press
Companion Animal Care and Welfare: The UFAW Companion Animal Handbook (UFAW Animal Welfare), Yates J, (2019)

Published by: Wiley Blackwell
Dictionary of Animal Behaviour (Oxford Paperback Reference), McFarland D, (2014), 2nd Edition
Published by: Oxford University Press
Encyclopaedia of Dog Breeds, Coile DC, (2015), 3rd Edition
Published by: Sourcebooks
Exotic Animal Care and Management, Judah V, Nuttall K, (2016), 2nd Edition
Published by: CENGAGE Delmar Learning
Farmwise – Your Essential Guide to Health and Safety in Agriculture, (2017), 3rd Edition
Published by: HSE
How to Do Your Research Project: A Guide for Students, Thomas G, (2022), 4th Edition
Published by: SAGE Publications
Health & Safety at Work Essentials, Freeths LLP, 2022, 9th Edition
Published by: Lawpack Publishing Ltd
Health and Safety at Work: An Essential Guide for Managers, Stranks J, (2019), 10th Edition
Published by: Kogan Page
Kennel and Kennelling: A Guide for Professional and Hobbyists, McMains JM, (2000), 2nd Edition
Published by: John Wiley & Sons
Kennel Design: The essential guide to creating your perfect kennels, Key D, Bailey G, (2008)
Published by: David Key Kennel and Cattery Design
Measuring Behaviour: An Introductory Guide, Martin P, Bateson P, (2021), 4th Edition
Published by: Cambridge
Restraint and Handling for Veterinary Technicians and Assistants, Ballard B, Rockett J, (2009), 1st Edition
Published by: Cengage
Second Nature: Environmental Enrichment for Captive Animals (Zoo and Aquarium Biology and Conservation Series), Shepherdson DJ, Mellen JD et al, (1999)
Published by: Smithsonian Books
The Complete Textbook of Animal Health and Welfare, Williams J, (2009)
Published by: Elsevier/Saunders
The Dog: Its behaviour, nutrition and health, Case LP, (2005), 2nd Edition
Published by: Wiley-Blackwell
The Domestic Dog: Its evolution, behaviour and interaction with people, Serpell J, (2016), 2nd Edition
Published by: Cambridge University Press
The Essential First Aid Handbook for Dog Owners, Scott J, (2020)
Published by: Independently published
The Kennel Clubs Illustrated Breed Standards, Kennel Club, (2011), 4th Edition
Published by: Ebury Press
The Ultimate Encyclopaedia of Cats, Cat Breeds and Cat Care, Edwards A, (2023), Reissue Edition
Published by: Hermes House
Understanding Cat Behaviour, Roberts G, (2014)
Published by: CreateSpace Independent Publishing Platform
What is my Dog Thinking? The essential guide to understanding pet behaviour, Baile G, (2014)
Published by: Pyramid
Zoo Animals Behaviour Management and Welfare, Hosey G, Melfi V, (2013), 2nd Edition

Published by: Oxford University Press
Zoo Animal Learning and Training, Melfi VA, Dory N et al, (2020), 1st Edition
Published by: Wiley-Blackwell

Websites

BIAZA – British and Irish Zoo Association
www.biaza.org.uk
Cat Protection
www.cats.org.uk
CIEEM
www.cieem.net
Companion Animal Behaviour Therapy Study Group
www.cabtsg.org
Department for Environment, Food and Rural Affairs
www.defra.gov.uk
Game and Wildlife Conservation Trust
www.gwct.org.uk
Global Issues
www.globalissues.org.uk
Governing Body of the Cat Fancy
www.gccfcats.org
Green Facts
www.greenfacts.org/en/ecosystems
Health and Safety Executive (HSE)
www.hse.gov.uk
International Cat Care (formally Feline Advisory Bureau)
icatcare.org
IUCN
www.iucn.org
Joint Nature Conservation Committee
www.jncc.defra.gov.uk
Lantra jobs in the land-based industry
www.lantra.co.uk/careers
NASCO – North Atlantic Salmon Conservation Organisation
www.nasco.int
Naturenet
www.naturenet.net
UK Pet Food (formerly PFMA)
www.ukpetfood.org
Pet Industry Federation
www.petfederation.co.uk
Pet Owners Association
www.pet-owners.co.uk
The Animal Behavior Society
www.animalbehaviorsociety.org/web/index.php
The Association for the Study of Animal Behaviour
https://www.asab.org/

The Atlantic Salmon Trust
www.atlanticsalmontrust.org
The British Horse Society
www.bhs.org.uk
The Ecology Global Network
www.ecology.com
The Kennel Club
www.thekennelclub.org.uk
The Marine Conservation Society
www.mcsuk.org
The Natural History Museum
www.nhm.ac.uk
The Royal Society for the Prevention of Accidents (ROSPA)
www.rospa.com

Scheme of assessment additional information

The below table illustrates where the Performance Outcomes (POs) and criteria within the Occupational Specialism (OS) content is assessed across the different assessment components.

Performance Outcome	Criteria	Assessment Component
PO1 Optimise health and welfare of animals	1.1 Policies and procedures to be considered when managing animals in different organisations.	Synoptic Assignment
	1.2 Hazards, risks and control measures associated with animal management.	
	1.3 Comparative anatomy and physiology of taxa.	
	1.4 Identification of species using Linnaean classification and how this impacts animal management.	
	1.5 Actions taken to manage notifiable and zoonotic diseases.	
	1.6 Factors that affect natural and atypical behaviour in animals.	
	1.7 Nutritional requirements to optimise the health and welfare of animal species according to life stage requirements.	
	1.8 Animal Welfare Frameworks and Legislation and Regulation.	
	1.9 Handling and restraint equipment and PPE used for animal management.	
	1.10 Techniques used to identify animals.	
	1.11 Methods of communication throughout different life stages of animals.	
	1.12 Techniques to identify, monitor, assess and record the health and welfare of animal species.	
	1.13 Sampling techniques used to support breeding, maintain health and maximise welfare in animals.	Synoptic Assignment

	1.14 Opportunities for animal species to be active in different environments.	
	1.15 Considerations that affect the movement and transportation of animal species.	
	1.16 Ethics of human-animal interaction.	
	1.17 Minor wound management and methods for administering medicines.	
	1.18 Data and information for different stakeholders.	
	1.19 The organisations and stakeholders involved in animal management.	
	1.20 Using behaviour and body language to support interactions and communication.	
	1.21 Application of suitable equipment for the restraint of animals.	
	1.22 Carry out a health assessment.	
	1.23 Administer treatment to an animal.	
	1.24 Prepare, present and monitor feed for the animal using relevant tools and equipment.	
	1.25 Apply preventative care techniques to support animal health and welfare.	
	1.26 Biosecurity control measures to prevent spread and containment of disease.	
PO2 Optimise animal environments to meet their needs	2.1 Effect of accommodation on biosecurity measures.	Synoptic Assignment
	2.2 Hazards, risks and control measures associated when optimising animal environments.	
	2.3 Sustainable waste management principles in animal management environments.	
	2.4 The physiological adaptations to meet environmental conditions.	
	2.5 How the natural habitats influence requirements for captive animal environments.	

	2.6 Encouraging natural behaviour within a captive environment.	
	2.7 How the animal welfare frameworks promote animal health and welfare within the environment.	
	2.8 The methods and equipment used for animal environment management.	
	2.9 Methods of enrichment used within different animal environments to promote health and welfare.	
	2.10 Factors affecting the design of animal accommodation and environment.	
	2.11 Schematic design of animal accommodation.	
	2.12 Suitability of environments for different animals.	
	2.13 Information and data relating to environmental design.	
	2.14 Measure and record accommodation data and information.	
	2.15 Cleaning an animal's enclosure.	
	2.16 Enrichment in accommodation.	
	2.17 Produce an accommodation design.	
PO3 Apply techniques to influence positive animal behaviour	3.1 Organisational policies and procedures when assessing animal behaviour.	Synoptic Assignment
	3.2 How the nervous system influences animal behaviour of different taxa.	
	3.3 Natural behaviours of animals during different life stages.	
	3.4 The influence of animal behaviour on welfare provision.	
	3.5 How pain, injury and disease influences animal behaviour.	
	3.6 Methods of animal handling and restraint equipment used for animal training purposes.	

	3.7 Animal response to internal and external factors.	
	3.8 Animal behaviours and their characteristics.	
	3.9 Methods of keeping records of animal behaviours.	
	3.10 The impacts of nutrition and feeding on behaviour.	
	3.11 Factors influencing animals learning and behaviour.	
	3.12 Suitability of learning theories and training aids for training goals.	
	3.13 Ethical considerations of training.	
	3.14 Carrying out a behavioural assessment.	
	3.15 Carry out a risk assessment when implementing a training programme.	
	3.16 Create a training programme.	
	3.17 Evaluate animals' behaviour and responses to a training programme.	
PO4 Provide information researched on an animal to promote animal welfare and conservation.	4.1 Evolution and adaptations of animals in conservation.	Research Project
	4.2 Purpose of legislation, regulations and frameworks in supporting conservation.	
	4.3 An animal's suitability for a conservation programme.	
	4.4 Movement and transport of animals for conservation activities.	
	4.5 Ethical considerations for conservation activities.	
	4.6 Organisations in conservation and their projects.	
	4.7 Methods and technologies used to promote conservation of species, rare breeds and habitats.	

	4.8 The importance of genetics in conservation.	
	4.9 The use of research to inform stakeholders.	
	4.10 Steps to planning a research project.	
	4.11 Steps to undertaking a research project.	
	4.12 Create and deliver a digital presentation.	

408 Animal Management and Science

Level:	3
GLH:	1030
Assessment method:	Research project, synoptic assignment and science knowledge test

What is this Occupational Specialism about?

The purpose of this specialism is for learners to know and undertake animal management and science techniques within the animal industry.

Learners will have the opportunity to plan, perform and evaluate their work while utilising a range of techniques, methods and resources.

Learners will develop their knowledge and understanding of and skills in:

- knowledge of behaviour, security and breeding practices of animals
- knowledge and skills for the management of good health and welfare of animals
- knowledge and skills for safe animal handling practices
- knowledge and skills for scientific investigations in animal science.

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

- What different methods can be used to optimise animal health and welfare?
- How are animals cared for on a daily basis?
- What scientific investigations and technologies are being used in animal science?

Performance Outcomes

On completion of this specialism, learners will understand and be able to:

1. apply research methods to collect and analyse scientific information on reproductive technologies and genetic manipulation
2. observe the behaviour, security and breeding practices of animals
3. plan for and manage the good health and welfare of animals
4. carry out safe animal handling processes
5. plan, perform, record and communicate findings of scientific investigations in animal science.

Completion of this specialism will give learners the opportunity to develop their maths, English and digital skills. Details are presented at the end of the specification.

Specialism content

Performance outcome 1

1. Apply research methods to collect and analyse scientific information on reproductive technologies and gene manipulation.

Knowledge Criteria

Sources of knowledge

1.1 Internal **sources** for research.

Range:
Sources – Standard Operating Procedures (SOPs), Health and Safety information logs, staff information, observations *ex situ,* internal experts, practical research.

What do learners need to learn?	**Skills**
Where and how to obtain research from internal sources, within the workplace or institution. Advantages and disadvantages of internal (primary) sources: • accuracy • credibility • currency • relevance • responsiveness to change.	EC4, EC5

1.2 External **sources** for research.

Range:
Sources – Internet, textbooks, scientific journals, observation *in situ*, government sources, syndicate services, literature reviews.

What do learners need to learn?	**Skills**
Where and how to obtain research from external sources. Advantages and disadvantages of external (secondary) sources: • accuracy • credibility/peer reviewed • currency • relevance • accessibility of the research.	EC4, EC5

1.3 The importance of confidentiality during research and **legal restrictions**.

Range:
Legal restrictions – General Data Protection Regulations (GDPR) 2018, Data Protection Act 1991.

What do learners need to learn?	**Skills**
Requirements of the GDPR and Data Protection Act for research and associated consequences for data leaks: • safe storage of information • used only for the intended purpose • fines for non-compliance. How confidentiality prevents information getting into public domain – restricts access to information before the completion of the research. How confidentiality protects the research: • prevents plagiarism • less likely to get involvement from activists. When confidentiality may impede the research: • for attracting funds/investment.	EC4, EC5

1.4 **Characteristics** of reliable sources.

Range:
Characteristics – Accuracy, availability of references, acknowledgement of peer review, currency, credibility, conflict of interest.

What do learners need to learn?	**Skills**
Characteristics of reliable sources: • Accuracy – is information accurate? • Availability of references – has research been referenced suitably? • Acknowledgement of peer review – has information been reviewed? • Currency – are sources up to date? • Credibility of author – previous published works, profession. • Credibility of publication – is it a respected publication? Is it peer reviewed? • Conflict of interest – why has the research been conducted? Has it been paid for by a company?	CSC, CSD, EC4, EC5

1.5 Fact, opinion and bias and their impact on research.

What do learners need to learn?	Skills
Fact, opinion and bias within sources. Fact: • a thing that is known or proved to be true • proven to be from a current and reliable source • how a fact may develop over time based on new information and research • the importance of factual information for research • ensures research is correct and up to date. Opinion: • it is a view or judgement about something, not necessarily based on fact or knowledge. • are opinions more useful from some sources compared to others? • does opinion have a place in scientific research? • can affect research validity if not balanced • may affect research if opinion is incorrect. Bias: • inclination or prejudice for or against someone or something • potential origins of prejudice • one-sided information • research paid for by a company • consequences of bias on research • balanced bias • can mean research is not clear and does not explore all options.	CSC, CSD, EC4, EC5

Research process, methods and design

1.6 Interpreting research briefs and **structuring** a research project.

Range:
Structuring – Format, title, aims and objectives (bullet points), hypothesis, purpose of the research, target audience, information sources and literature review, budget, resources, timelines, ethical review, methodology, presentation of results, analysis of results, discussion, overall conclusion, references.

What do learners need to learn?	Skills
Research briefs including instructions, objectives, context, target audience, format of output: • how to interpret a research brief and what is expected for a research project • how to plan a research project and research proposal ○ carrying out a literature review of relevant information	EC1, EC2, EC3, EC4, EC5

○ validate information and data ○ assess suitability of information and data ○ identify sources of information ○ record information ○ organise data into usable forms ○ input, process, manipulate and interrogate data digitally ○ create texts (web page, report, abstracts) ○ gather relevant information and data ○ communicate and present information and ideas orally to others • critical analysis pathway action planning. The format of research projects: • when to use essay or report style • how and where to use citations and Harvard referencing • importance of scientific writing and how this can be changed by using first, second or third person. Structure of a research project and what to include in each section listed in the range.	

1.7 Developing and undertaking research using different **methods** and research design.

Range:
Methods – Qualitative (surveys, interviews, non-numerical observation data), quantitative (numerical data, scientific investigation results, numerical observation data), primary, secondary.

What do learners need to learn?	**Skills**
Advantages and disadvantages of research methods and how they are used: • suitability for the research being carried out • qualitative – coding of responses to get numerical data for presentation • quantitative – formation of graphs and charts. The importance of precision and accuracy when collecting data and results: • precision • accuracy. Design characteristics of practical research and the advantages and disadvantages of each: • descriptive – looking at a situation/phenomenon • comparative – comparing two or more aspects.	EC4, EC5, MC5, DC4

1.8 **Hazards** and risks associated with undertaking primary research.

Range:
Hazards – General health and safety, lone working, environmental risk.

What do learners need to learn?	**Skills**
How hazards and risks might affect primary research: • injury to participants/researcher may delay or prevent research • environmental hazards could delay research or researcher • dangerous incidents could be detrimental to health • ethical issues. How to manage the risks: • organisational control methods (protocols, Standard Operating Procedures (SOPs), policies) • personal control methods (PPE, training) • risk assessments. Hazards of undertaking secondary research and how they can be managed.	CSC, CSD, EC4, EC5

1.9 Importance of animal research and **stakeholders** involved.

Range:
Stakeholders – Animal charities, animal sanctuaries, laboratories, veterinary practices, zoos, pharmaceutical companies, wildlife centres, educational exhibits (colleges, universities), governmental bodies; Department for Environment, Food and Rural Affairs (DEFRA) Animal and Plant Health Agency (APHA).

What do learners need to learn?	**Skills**
The importance of animal research: • how valuable research is in development of new information (technologies, welfare, health, disease, behaviour) • conservation • how animal research is helpful for things of public interest (medical testing). Considerations when carrying out research: • types of research • controls of experiments • three Rs of research (reduction, refinement, replacement). How stakeholders are involved in research: • the contribution they make to improve animal care and welfare.	CSC, CSD, EC4, EC5

Data collection, handling and processing

1.10 **Formats** of data collection and **analysis**.

Range:
Formats – Non-proprietary, open, with documented standards, image, text, audio, database.
Analysis – Quantitative (descriptive statistics, mathematical) and numerical (graphs, tables, charts and diagrams) and qualitative (themed data).

What do learners need to learn?	**Skills**
Purpose of data collection: • its role in answering questions, making decisions • implications of findings • presentation of results using suitable formats and analysis. How to interpret, analyse and evaluate data to draw conclusions from results and make recommendations for future study/improvements: • critical pathway analysis action planning (Gantt charts) • comparing results and conclusions to the action plan • contingency planning for when plans cannot be followed.	CSC, CSD, EC4, EC5, DC1, DC2

Genetic manipulation

1.11 **Reproductive technologies** and **gene manipulation techniques**.

Range:
Reproductive technologies – Infertility treatments, superovulation, ovulation indicators, embryo transplant, artificial insemination
Gene manipulation techniques – Gel electrophoresis, polymerase chain reaction (PCR), DNA extraction, recombinant SNA technology, cloning, gene targeting, genetic testing, gene functioning and regulation, restriction enzymes, transgenics, DNA fingerprinting.

What do learners need to learn?	**Skills**
Reproductive technologies, reasons for carrying them out and the ethical considerations: • infertility treatments – IVF, hormones • superovulation – hormonal treatments • ovulation indicators – oestrus behaviours, pedometers • embryo transplants – process of flushing and implantation, donors, recipients • artificial insemination – sperm sexing, distance, genetic selection, safety • genetic engineering, pregnancy diagnosis and gene therapy. Gene manipulation techniques and genetic research techniques used, including the limitations of the techniques and the ethical considerations for each: • Gel electrophoresis • PCR • DNA extraction	EC4, EC5

- restriction enzymes
- recombinant DNA technologies – marker genes, vectors in transfection and transduction, somatic cell nuclear transfer and embryo splitting
- cloning – stem cell research, extinct species
- gene targeting – knockout mice
- genetic testing – disease databases, avian gender determination
- gene functioning and regulation – Enviropig, regulation of wound healing
- transgenics – insulin production, pharmaceuticals
- DNA fingerprinting – paternity testing, bio-assaying, forensics.

Ethics

1.12 Ethical **approaches** and considerations for genetic technology and biotechnology.

Range:
Approaches – Utilitarianism, animal rights, contractarianism, relational, respect for nature, consequentialism, animal sentience.

What do learners need to learn?

Definition of ethical approaches and the main considerations for each.

Ethical considerations of changing animals through genetic modification and technologies:

- impacts on welfare
- impacts on conservation efforts
- impacts of it being done by a lay person (artificial insemination in bull breeds).

Regulatory issues and regulation of genetic technologies in animals, including the role of the Food Standards Agency (FSA) and Department for Environment, Food and Rural Affairs/Animal Plant and Health Agency (DEFRA/APHA):

- animals as food– farmed salmon (hybridising with wild stock– genetic pollution), Belgian Blue cattle (high muscle content).

Use of animals that have been genetically transformed in biotechnology including advantages and disadvantages:

- public perception
- benefits and limitations of genetic techniques.

Breeding ethics:

- role of zoos for conservation
- examples of ethical and non-ethical breeding
- excess stock management.

Skills

CSC, CSD, EC4, EC5

Validation and presentation

1.13 Validation and methods for **presentation** of findings.

Range:
Presentation – Graphical, tabular, reports, presentation software, scientific posters.

What do learners need to learn?	**Skills**
How to interpret findings from research: • validity and credibility • current • reliability • limitations • process of drawing conclusions. Advantages and disadvantages of different methods of presentation. How to adapt presentation methods for different audiences: • scientific audience • animal professionals.	EC1, EC2, EC3, EC4, EC5, MC5, DC1, DC2, DC4

Skills

1.14 Identify and source suitable information for analysis.

What do learners need to demonstrate?	**Skills**
Data collection: • techniques for collecting data • consideration of data type. Data presentation: • consider how data will be presented before starting data collection. Data analysis: • literature reviews • data analysis • when statistical testing may be necessary. Interpretation of scientific journal papers.	EC1, EC2, EC3, EC4, EC5

1.15 Use appropriate primary and secondary research methods to gather information for scientific analysis.

What do learners need to demonstrate?	Skills
Primary (internal) data collection: • Standard Operating Procedures (SOPs) • Health and Safety information logs • staff information • observations *ex situ* • internal experts • practical research. Secondary (external) data collection: • internet • textbooks • scientific journals • observation *in situ* • government sources • syndicate services • literature reviews.	CSC, CSD, EC4, EC5, MC5

1.16 Use appropriate **tools** to gather information.

Range:
Tools – Survey tools, key word research tools, scientific nomenclature and desktop research.

What do learners need to demonstrate?	Skills
Use correct binomial nomenclature or scientific terminology to ensure accuracy of research. Use of appropriate search engines: • Google scholar • understanding of why Wikipedia is not a reliable source. Use of survey sites and reliability of data collection.	CSC, CSD, CSE, EC4, EC5

1.17 Assess information and research findings against the original proposal or brief.

What do learners need to demonstrate?	Skills
Check and verify information to ensure it is complete, accurate, appropriate and of good quality. How to recognise when information has been peer reviewed. Use null and alternative hypotheses.	CSC, CSD, EC2, EC4, EC5

Assess sources for reliability, validity, credibility, accuracy and currency within a literature review. Using Harvard referencing in research.	

1.18 Present research data to inform on reproductive technology and genetics.

What do learners need to demonstrate?	**Skills**

Use suitable presentation techniques/formats for data:
• scientific poster (how to layout, what to include, structure, how to condense information and word counts)
• digital presentation
• lecture/seminar/webinar
• information sheets
• written report
• using digital equipment
  ○ represent information and data using mathematical diagrams
  ○ create and edit digital media
  ○ use digital tools to engage an audience.
 	
Presentation skills:
• levels of eye contact
• tone of voice
• confidence
• clarity of delivery
• use of imagery and diagrams.
 	
Relate presentation techniques/formats for the intended audience:
• scientific
• educational (children and public)
• within an organisation
• animal professionals.
	CSB, EC1, EC2, EC3, EC4, EC5, EC6, DC1, DC2, DC3

1.19 Identify the uses for reproductive technologies.

What do learners need to demonstrate?	**Skills**
Identify the different equipment used for reproductive technologies and when they should be used. Oestrus detection and management: • pedometers • urine and faecal testing • temperature monitoring	EC4, EC5

• oestrus manipulation – hormonal treatments. Copulation and onset of pregnancy: • artificial insemination • embryo transplantation. Pregnancy diagnosis: • ultrasound • blood testing • X-ray.	

1.20 Assess the regulatory and ethical dimensions of the genetic manipulation of animals.

What do learners need to demonstrate?	**Skills**
Health and welfare concerns associated with selective breeding: • creating severe traits (brachycephalic breeds, high meat production but no extra bone strength). Risks associated with reduced gene pools: • lack of genetic diversity • cannot out-breed genetic faults easily. Ethical considerations behind transgenics: • religious restrictions (do not play God, some cultures cannot eat modified foods) • freedom of choice • interfering with nature. Regulatory considerations of genetic manipulation of animals: • Animal Welfare Act 2006 • Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018 • The Animal (Scientific Procedures) Act 1986 • Animal Welfare (Sentience) Act 2023.	CSC, CSD, EC4, EC5

.

1.21 Interpret research briefs and plan a research project.

What do learners need to demonstrate?	**Skills**
Interpret a research brief and what is expected for a research project. Plan a research project: • research action plan – topics to be researched, resources, search criteria, use of time, monitoring progress, contingency plans • adjust timeframes to suit the progress of the research project, sequencing and prioritising, allocating time to each step, managing own time	EC4, EC5, DC2

- critical analysis pathway action planning (Gantt chart)
- contingency planning for when plans cannot be followed.

Adapt the research action plan where necessary.

Create a proposal for a research project:

- identify and develop search criteria, aims, objectives or questions to be answered
- principles of research design
- methodology for research
- assess suitability of information and data
- techniques to analyse and interpret information and data
- identify sources of information.

Performance outcome 2

2.The behaviour, security and breeding practices of animals

Learners must develop knowledge about a range of mammals, birds, reptiles, amphibians, aquatics and invertebrates.

Knowledge criteria

Legislation and regulation

2.1 **Legislation and regulation** requirements for breeding animals.

Range:
Legislation and regulation – Animal Welfare Act 2006, Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018, Animal Welfare (Sentience) Act 2023, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Department for Environment, Food and Rural Affairs (DEFRA) Codes of Practice, Control of Dogs Order 1992, Dangerous Dogs Act 1991, Dangerous Wild Animals Act 1976, Genetic Technology (Precision Breeding) Act 2023, Microchipping of Cats and Dogs (England) Regulations 2023, The Animal (Scientific Procedures) Act 1986, Veterinary Surgeons Act 1966, Veterinary Medicine Regulations 2013, Welfare of Animals (Transportation) (England) Order 2006, Welfare of Farmed Animals (England) Regulations 2007, Wildlife and Countryside Act 1981, Zoo Licensing Act 1981, Zoonoses Order (Amendment)(England) 2021.

What do learners need to learn?	**Skills**
The aims and purposes of relevant (and current) legislation and regulation that applies to the animal science sector and related to the safe handling and practices for breeding animals. The responsibilities to different stakeholders under different pieces of legislation: • staff • public. Consequences of not adhering to legislation and regulation: • employer (fines, prosecution, public perception, neglect of duty of care to animal) • employee (risk to safety, health and welfare, potential injury, neglect of duty of care to animal, loss of job) • animals (risk to safety, health and welfare, potential injury, neglect of duty of care to animal).	EC4, EC5

Animal biology

2.2 Animal **classification**.

Range:
Classification – Linnaeus classification, Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species, Phylogenetic trees, Physical traits of taxa.

What do learners need to learn?	**Skills**
How classification systems may change in response to new evidence: • new evidence changes existing classes of species to a new class/order. Alternative classification systems used to group animals: • phylogenetics – using DNA sequences to create a phylogenetic tree • cladistics – using common ancestors to create a phylogenetic tree • ecological – using environmental interactions and habitats to group animals. Evolutionary relationships from phylogenetic trees: • how species evolved from common ancestors. The importance of using scientific binomial nomenclature when discussing animal species. Characteristics that help to classify animals and exemptions in each (with example species): • mammals – fur/hair, mammary glands, endothermic/warm-blooded, live on land (exceptions of flying mammals and marine mammals), viviparous (exceptions such as egg-laying mammals), vertebrate • birds – feathers, a beak, lay eggs/oviparous, endothermic/warm-blooded, vertebrate • reptiles – scales, ectothermic/cold-blooded, may produce eggs/oviparous or live young, vertebrate • amphibians – moist skin, ectothermic/cold-blooded, live on land and in water to reproduce/semi-aquatic, metamorphosise, vertebrate, oviparous • fish – scales, gills, ectothermic/cold-blooded, vertebrate, oviparous (exceptions such as ovoviviparous/viviparous fish) • invertebrates – all have an exoskeleton, cold-blooded – Insects (six legs, three body parts), Arachnids (eight legs, three body parts), Crustaceans (exoskeleton is very hard, three body parts, usually 10 legs, some with an exception under the Animal Welfare Act), Cephalopods (a merged head and foot, tentacles, an exception under the Animal Welfare Act). Use of modern technologies for classification and the advantages and disadvantages for each:	EC4, EC5, DC1

• photographic evidence • DNA analysis • drones and GPS tracking • microscopy.	

2.3 Evolution and natural **selection** of common wild and captive animals.

Range:
Selection – Gene flow, gene pool, genetic drift, founder effect, bottlenecking, stabilising selection, directional selection, disruptive selection, natural selection, sexual selection, artificial selection, Darwin's theory of evolution, survival of the fittest, extinction, adaptive radiation.

What do learners need to learn?	**Skills**
The different types of selection in evolution and when they are found. The use of the Hardy-Weinberg principle and the conditions for the H-W equilibrium. Darwin's theory of evolution and how animals have evolved through natural selection using the following named examples: • Finches and their beak shape • Galapagos tortoises. The distinguishing features used to establish evolutionary relationships between animals and micro-organisms: • different taxa and their features • survival of the fittest • morphological classification • convergent and divergent evolution • population dynamics • predator – prey arms race • development of antibiotic and anthelmintic resistance. Causes of species extinction and their impacts on the rate of extinction of named species, including how they might be mitigated: • human interference (hunting/poaching, pollution, habitat destruction/fragmentation, anthropogenic climate change, increasing population, tourist industry) and mitigations to help prevent extinction • non-native species • climate change, natural disasters.	EC4, EC5, MC4

Animal conservation

2.4 The changing role of zoos and **national** and **international** organisations involved in conservation.

Range:

National – Royal Society for the Protection of Birds (RSPB), Rare Breeds Survival Trust (RBST), The Wildlife Trusts, National Conservation Service (NCS), Natural England, British and Irish Association of Zoos and Aquariums (BIAZA), Forestry Commission, National Trust, Amphibian and Reptile Conservation Trust (ARC), Association of British and Irish Wild Animal Keepers (ABWAK), Joint Nature Conservation Committee (JNCC).

International – International Union Conservation of Nature (IUCN), Endangered Species International, Worldwide Fund for Nature (WWF), International Wildlife Conservation Society, Application of the Convention on International Trade in Endangered Species (CITES), European Association of Zoos and Aquariums (EAZA), World Association of Zoos and Aquariums (WAZA).

What do learners need to learn?	**Skills**
The role of zoos: • education, conservation, recreation, research, welfare • opposing views to zoos • how zoos have changed over time. How national and international organisations are involved in the conservation of species and their habitats. Strategies for conservation and their impact on species numbers: • International Union for Conservation of Nature (IUCN) • IUCN Red list • One Plan • ZSL's Edge programme • SSSMZP regulations • Biodiversity Action Plan (BAP) and associated species • Marine Protected Areas (MPAs) • reducing use of single use plastics • Minimum Conservation Reference Sizes (MCRS) in UK waters. The differences between *in situ* and *ex situ* conservation and the activities that may be carried out for each: • breeding programmes • relocation • reintroduction • education • observations/monitoring • habitat conservation • poaching/hunting prevention.	CSB, EC4, EC5

2.5 **Techniques** and **technologies** used to assess the conservation status of species and habitats.

Range:
Techniques – Direct observation, genetic mapping, photographic records, tracking, acoustic monitoring, surveying, data monitoring
Technologies – Drones, GPS, tracking collars, camera traps, geolocation, identification chip, satellites, acoustic sensors.

What do learners need to learn?	**Skills**
The benefits and limitations of the techniques and technologies used to assess conservation status and how different stakeholders apply them: • NGOs • communities • researchers and workers • organisations (zoos, charities) • animals. Knowing when conservation is necessary to prevent species extinction and habitat loss. Methods for resolving conservation issues: • captive population management and its effectiveness (same sex groups, breed and cull). The impact of conservation activities and their benefits and limitations: • impact of conservation action on biodiversity and ecosystems • impact of lack of action on biodiversity and ecosystems.	EC4, EC5, DC1

2.6 Ethics of human-animal interaction in **conservation** activities.

Range:
Conservation – Breeding for release, rehabilitation of orphans, wildlife rescue and rehabilitation, protection of habitats, *in situ* and *ex situ.*

What do learners need to learn?	**Skills**
Conservation activities when they may be used and the importance of each. Ethics of human-animal interaction and how these are applied in conservation: • the necessity of human-animal interaction and when it might be used • how human-animal interaction may influence the natural behaviour of a species • the impact of human-animal interaction on rehabilitation or release • the benefits and limitations of human-animal interaction to the	CSB, EC4, EC5

human
- the benefits and limitations of human-animal interaction to the animal including unintended consequences and habituation
- differences between the consequences of human-animal interaction *in situ* and *ex situ*.

The different ethical theories and the main considerations for each:
- utilitarianism
- animal rights
- contractarianism
- relational
- respect for nature
- consequentialism
- animal sentience.

Ethical concerns of the public:
- considerations of whether species should be kept captive
- animal rights and conservation activists/protesters
- risk to health and safety
- damage to property/business
- anthropomorphism.

How actions of key stakeholders mitigate concerns of the public:
- conservationists
- governmental bodies
- charities
- rehabilitation centres
- landowners
- zoos and animal collections
- education
- influencing legislation
- publicity
- social media.

How welfare and education play an important role in conservation:
- education of the public
- the impact of public figures on conservation
- the impact and use of advertising and social media on conservation.

Breeding ethics:
- role of zoos for conservation
- examples of ethical and non-ethical breeding.

Breeding captive animals

2.7 Planning **considerations** for population management.

Range:
Considerations – Selection of parents (genetics, health, age, temperament, inbreeding coefficients), stud records, neutering programmes, welfare considerations, space allowances, species requirements (solitary or social), endangered species, reintroduction programmes, reproductive strategies, animal evaluation.

What do learners need to learn?	**Skills**
When captive animals may be bred: • conservation • increase population • research/laboratory animals • leisure/pets and entertainment • sport (game, racing) • working (police, military, search and rescue, guide dogs, therapy dogs). The considerations needed for population management and their importance when breeding captive animals. The effect of wild animal populations on captive animal populations: • pet trades – reptiles, fish, birds • zoo animal conservation • strays • disease and parasites • media coverage of a species. Reproductive strategies and conditions needed for breeding of mammalians and avians: • mate recognition systems • survival strategies and how these are used to benefit species • maternal and paternal care of neonates and strategies used by different species • environmental conditions required • types of parental care • keeper intervention or incubation • control of breeding – contraceptives, manipulation of breeding cycle, neutering • mating strategies – polygamy, monogamy, non-associative, courtship. How animal evaluation before mating can maximise breeding success: • genetic suitability • genetic disorders • hereditary, congenital defects	EC4, EC5

• sexually transmitted diseases • veterinary health assessments • behavioural disorders • physical suitability of pairings • species specific – solitary animal introductions, slow introductions • reproductive behaviours – mating rituals. How evaluation of the animal's environment can maximise breeding success: • environmental conditions • welfare provision. Breeding considerations and reproductive strategies for other taxa: • incubation • egg collection • environmental considerations • sex determination based on temperature.	

2.8 Population management **techniques**.

Range:
Techniques – Translocation, surveying, humane euthanasia/hunting, thermal cameras, capture/mark/release, implanting, fertility control/contraceptives, physical barriers, trap/neuter/return, habitat management.

What do learners need to learn?	**Skills**
When and why each population management technique is used and the advantages and disadvantages of each. How population management contributes to conservation: • changing the gene pool by translocation • prevent overpopulation of non-native species • prevention of endangerment/extinction. Methods of humane euthanasia: • chemical • bolt gun/shooting • breaking the neck • electrocution • gas. When hunting may be used as a tool for managing wild populations and the ethics surrounding this: • fox hunting • deer hunting • wallaby population in Australia.	CSC, CSD, EC4, EC5

2.9 Breeding programmes, values and **professional bodies**.

Range:
Professional bodies – British and Irish Association of Zoos and Aquariums **(**BIAZA), European Association of Zoos and Aquariums (EAZA), World Association of Zoos and Aquariums (WAZA), breed associations and societies (including zoo, domestic and livestock species).

What do learners need to learn?	**Skills**
The purpose of the breeding programmes and how they are used: • stud books • conservation breeding programmes • International Union for the Conservation of Nature (IUCN) Red list • Zoological Information Management System (ZIMS) • Zoo 365 • Labtracks • Secretary of State's Standards of Modern Zoo Practice (SSSZMP) guidance • species specific breeding programmes (livestock breed groups, domestic animal breed societies). Selection and mating schemes, their uses and responses to selection: • selective breeding • gene testing. The contributing factors for estimating value of breeding programmes: • Estimated Breeding Valur (EBV) • value of offspring • value of yields produces by those animals. The differences between pedigrees, inbreeding, line breeding and outbreeding. Breed profiles: • where they can be found • why they are important. The role of working animals in human society and their breeding programmes: • assistance animals (guide dogs, pets as therapy (PAT) dogs, hearing dogs) • sniffer dogs • search and rescue dogs • military and police dogs and horses • draught animals (equines, oxen, elephants) • gundogs • pest control dogs (terriers).	CSB, EC4, EC5

2.10 **Equipment** for breeding and handling of pregnant or gravid animals.

Range:
Equipment:
Large animals – crush, hurdles, pig boards, race, stocks, twitch, halters/headcollars, lead lines/ropes.
Domestic animals – muzzle, cat bag, crush cage, collar and lead, blankets and towels, gauntlets, pet carriers, snake hooks, halters, nets.
Avian animals – net, towel, bag, gauntlet, falconry equipment, swan bags.
Exotic animals – snake hooks, gauntlets.
During parturition – ropes, winches, gloves, towels, calving jacks, forceps, chemical (oxytocin, anaesthetic, calcium).
During breeding – breeding specific pens, long gloves, lubrication, Artificial Insemination (AI) equipment, iodine, colostrum replacement, bottles/teats, heat pads.

What do learners need to learn?	**Skills**
When an animal may be described as being pregnant or gravid. When equipment and handling may cause stress to a pregnant animal and the impact on the pregnancy and animal: • absorption or abortion of the foetus • vaginal/uterine prolapse • eclampsia • mastitis • metritis • retained placenta. When and how breeding equipment may be used. How handling may need to be adapted for breeding males. Safe working practices when handling breeding animals.	EC4, EC5

Breeding management

2.11 **Management** of the breeding female and **potential problems** that may occur.

Range:

Management – Health and nutrition prior to breeding, oestrus cycle, copulation, pregnancy diagnosis, gestation and hormones, lactation and hormones, record keeping, environmental conditions, oviparous, viviparous, ovoviviparous.

Potential problems – Parturition issues, health issues, miscarriage, abortive disease, welfare issues.

What do learners need to learn?	**Skills**
Management of female from conception to weaning: • breeding profile – age, genetics, physical conformation, disease, temperament • importance of health and nutrition prior to breeding and how it affects reproductive health • preventative care techniques and timing • steps of the oestrus cycle (oestrus, dioestrus, anoestrus, presence of the corpus luteum, luteal versus follicular phase, monoestrus versus polyoestrus cycles) and the associated hormones and their effect on behaviour (progesterone, oestrogen, Follicle-Stimulating Hormone (FSH), Luteinising Hormone (LH)) • copulation techniques and timing (natural, AI) • pregnancy diagnosis techniques and the species they are likely to be used in, including gravid species (scans, blood samples, rectal examination, ultrasound, behaviour, x-ray) • welfare plan during gestation, parturition and lactation (nutrition, environment, disease prevention, parasite control) • parturition and associated hormones (oxytocin, prolactin) • the records that should be kept and why • when intervention is required • care during incubation by the female or artificially • environmental conditions (temperature, humidity, size) and how they may affect the gender of offspring in some species • oviparous, viviparous, ovoviviparous and the species they occur in • physical and behavioural changes during gestation. Potential problems that could occur in the management of the female from conception to weaning: • infertility • parturition issues - dystocia, caesarean, malpresentation • rejection of offspring • associated health issues – mastitis, metritis, retained placenta, eclampsia, uterine prolapse • methods to prevent miscarriage, foetal reabsorption and still birth • abortive disease – Enzootic Abortion of Ewes (EAE), *Chlamydophila abortus*, toxoplasma and zoonotic considerations for keepers working with the animals • issues with the welfare plan/consequences of not adhering to the	CSC, CSD, EC1, EC4, EC5

plan. Considerations for other taxa: • Aves (parental care, brooding, egg binding) • Reptilia (parental care, egg binding, substrate) • Amphibia (parental care, water quality, predation) • Aquatic (water quality, predation) • Invertebrate (food source, substrate).	

2.12 **Management** of the breeding male and potential problems that may occur.

Range:
Management – Breeding profile, breeding welfare plan, copulation, behaviour management, breeding seasons.

What do learners need to learn?	**Skills**
Management of the breeding male and how it affects the use of the male: • breeding profile – age, genetics, sperm count, physical conformation, disease, temperament • breeding welfare plan – health, housing, nutrition • management of copulation – physical differences, natural, AI and ethical considerations behind this (animal safety, animal welfare, human intervention) • behaviour management, hormones and health and safety considerations for smaller and larger species • management out of breeding season/when not in use – consider male rental/borrowing as well as permanent housing. Potential problems that could occur in the **management** of the male: • health problems (balanitis, phimosis, prostate problems, cryptorchidism, monorchidism, orchitis) • infertility • physical issues preventing copulation. Considerations for other taxa: • Aves (parental care, feeding, competition) • Reptilia (parental care, competition) • Amphibia (parental care, competition) • Aquatic (parental care, seahorses, mouth brooding, competition) • Invertebrate (competition).	CSC, CSD, EC1, EC4, EC5

2.13 **Management** of the offspring and **potential problems** that may occur.

Range:

Management – Natural rearing, colostrum intake, parental care, offspring care plan, reintroduction to social group, weaning, excess stock and dispatch techniques.

Potential problems – Still birth, orphans, surrogacy, hand rearing, not feeding, not bonding, rejection.

What do learners need to learn?	**Skills**
The management and care requirements of offspring from birth to weaning: • parental care and the species that may use each type – maternal or paternal, biparental, alloparental, intensive, none, parent-offspring bonding, imprinting (filial and sexual) • immediate care – airway, umbilicus • the importance of neonatal colostrum • health care plan and how it changes for a neonate – substrate, hygiene, environmental, vaccinations, preventative treatments • the correct timing and methods for reintroduction to social group/public • management of weaning and when and how to separate the mother and offspring • excess stock management and humane dispatch techniques • early training • homing to new locations/owners. The problems that could occur in the offspring from birth to weaning, including knowing when human intervention is required: • still birth and potential causes • management of orphans to include surrogacy • hand rearing techniques with consideration of imprinting and ethics behind this, and behavioural impacts of hand rearing • consequences of not feeding, not bonding and rejection • possible health implications (fading puppy/kitten syndrome, toxic milk syndrome, umbilical infection, swimmers, herpes, hernias, cleft palate) and steps to take if these are suspected. Considerations for other taxa: • Aves (imprinting, hatching, incubation, feeding, fledging) • Reptilia (hatching, incubation, feeding) • Amphibia (metamorphosis, predation, feeding) • Aquatic (feeding, predation) • Invertebrate (feeding, predation).	CSC, CSD, EC1, EC4, EC5

2.14 **Care plans** for the offspring in the first 0–48 hours of life.

Range:
Care plans – Environment, hygiene, substrate, space, temperature, monitoring, veterinary care.

What do learners need to learn?	**Skills**
How to adapt husbandry care plans of the mother to meet the needs of the offspring. The monitoring of the offspring's first 0–48 hours of life and development to weaning or adulthood: • interactions • behaviours • identification of poor health and congenital conditions • precocial versus altricial and how this affects the care of the offspring • feeding and drinking and the importance of colostrum – correct latching, antibodies, gut permeability • urination and defecation • need for veterinary care • bonding and imprinting • immediate care – airway, care of umbilicus, identification of congenital disease. The recording of the offspring's first 0–48 hours of life and development to weaning or adulthood: • veterinary checks and when they are required • record keeping – weight, eating, medications, births and deaths • interaction and behaviour – issues surrounding imprinting, interspecific and intraspecific interactions.	CSC, CSD, EC1, EC4, EC5

2.15 Reproductive performance and **life stages**.

Range:
Life stages – Neonate, juvenile, adult (working, breeding), senior, geriatric

What do learners need to learn?	**Skills**
How the life stage of the animal affects their reproductive performance: • start of sexual behaviours • peak reproductive performance • poor performance – less fertile, inexperience, mobility issues, breed. Signs of when an animal has reached sexual maturity: • age • behaviour and temperament • oestrus • muscle development.	CSC, CSD, EC1, EC4, EC5

How to determine lifetime reproductive performance:

- quality and quantity of previous offspring
- health and welfare of breeding individuals
- mating frequencies.

Restrictions from professional bodies:

- age requirements
- gaps between litters
- number of litters
- number of caesareans.

Genetics and genetic manipulation

2.16 **DNA** and **RNA** structure and function.

Range:
Deoxyribonucleic acid (DNA) – Nucleotide bases, nucleic acid pairing, purines and pyrimidines.
Ribonucleic acid (RNA) – Messenger RNA (mRNA), transfer RNA (tRNA), ribosomal RNA (rRNA).

What do learners need to learn?	**Skills**
The structure and function of DNA and RNA molecules. How the structural components of DNA interact to form the double helix shape: • hydrogen bonds • nucleotides • base pairing • sugar phosphate backbone. Structural and functional differences between DNA and RNA: • number of strands • hydrogen bonding between strands • nucleotides and base pairing • sugar. How DNA forms chromosomes: • formation of chromosomes – histones, chromatin, euchromatin, heterochromatin • define chromatids, centromeres, telomeres, karyotypes and understand their role • gene expression including chromosome numbers, genes, alleles • sex determination and non-disjunction – Kleinfelter's syndrome, Turner's syndrome, XYY syndrome.	EC4, EC5

The importance of each component of DNA for replication.	

2.17 DNA **replication**.

Range:
Replication – Semi-conservative replication, transcription and translation

What do learners need to learn?	**Skills**
The process of DNA replication to include: • semi-conservative replication (Meselson-Stahl) • transcription and translation • enzymes involved in transcription – helicase, DNA polymerase, primase, ligase • replication forks and Okazaki fragments • leading strand and lagging strand • reading 5' to 3' and why this is important • how incorrect replication can lead to mutations and the importance of proofreading.	EC4, EC5

2.18 **Mitosis** and m**eiosis** and their **stages**.

Range:
Mitosis stages – Interphase, prophase, metaphase, anaphase, telophase, cytokinesis.
Meiosis stages – Prophase I, prometaphase I, metaphase I, anaphase I, telophase I, prophase II, metaphase II, anaphase II, telophase II, cytokinesis.

What do learners need to learn?	**Skills**
The processes that occur at each stage of mitosis and their importance in growth and repair. The process at each stage of meiosis including: • the importance of crossing over • random assortment • gametogenesis. The similarities and differences between mitosis and meiosis.	EC4, EC5

2.19 **Mendelian** inheritance.

Range:
Mendelian – Mendel's laws, genetic variation, monohybrid and dihybrid crosses.

What do learners need to learn?	**Skills**
The importance of Mendel's Laws and their application in genetics. • The Law of Dominance – recessive and dominant alleles • The Law of Segregation – separation of homologous pairs during meiosis • The Law of Independent Assortment. How the steps of meiosis impact genetic variation. Interpretation of monohybrid and dihybrid crosses: • Punnett squares to F2 generation • FOIL method for identifying gametes • predicted genotypic and phenotypic ratios • define genotype, phenotype, heterozygous, homozygous, dominant, recessive, F1 and F2 generation. Prediction of phenotypic ratios from a mating for monohybrid and dihybrid crosses using Hardy-Weinberg.	EC4, EC5, MC4

2.20 Types of **mutations**.

Range:
Mutations – Spontaneous, induced, harmful, beneficial, neutral.

What do learners need to learn?	**Skills**
The causes of mutations: • spontaneous (mainly through endogenous factors – failure of DNA repair mechanisms) • induced (mainly through exogenous factors – mutagens, UV light, heavy metals, nuclear radiation, x-rays). The types of mutation and whether they are harmful, beneficial or neutral: • point mutations, insertion, deletion, translocation, duplication, frameshift, non-sense, missense.	EC4, EC5

2.21 Gene **interactions**.

Range:
Interactions – Codominance, incomplete dominance, multiple alleles, lethal genes, sex-linked traits, epistasis.

What do learners need to learn?	**Skills**
The way in which genes interact, with named examples, and the advantages and disadvantages to the offspring: • codominance and incomplete dominance – roan cattle, colours in royal pythons • multiple alleles – rabbit coat colour, human blood groups • lethal genes (and whether the dominant or recessive allele is the cause) – Manx cats, creeper gene in chickens, agouti mice • sex-linked traits, sex-influenced traits, sex-limited traits – colour blindness, haemophilia, muscle mass, milk production • epistasis – Labrador coat colour.	EC4, EC5

2.22 **Epigenetics** and gene expression.

Range:
Epigenetics – DNA methylation, histone modification, non-coding RNA.

What do learners need to learn?	**Skills**
Basic principles and application of epigenetics: • epigenetics and development – stem cells specialising into other cells • epigenetics and age – DNA methylation (how many genes are turned on or off) • epigenetics and reversibility – environmental changes • infection – pathogens change epigenetics to weaken immunity, histone modification to speed up growth and repair • cancer – some mutations increase risk of cancer, the effect of non-coding RNA in inhibiting growth of cancers • nutrition during pregnancy – poor nutrition inhibiting growth.	EC4, EC5

2.23 Population **ecology** and genetics.

Range:
Ecology – Size, density, dispersion, occupancy, geographic range.

What do learners need to learn?	**Skills**
How to apply the Chi-squared probability formula to compare observed and expected ratios: • $X^2 = \sum \frac{(observed - expected)^2}{expected}$ • calculating the deviations from the expected ratios • how gene interactions affect predicted ratios.	EC4, EC5, MC4

Population **ecology**: • Size – how many total individuals and ways to determine – capture-mark-recapture, surveys, camera trapping? • Density – how many individuals per unit or area? • Dispersion – how are individuals arranged within a population? • Occupancy – does a species in a population occur in a particular habitat? • Geographic range – what are the geographic limits of a species?	

Skills

2.24 Create plans for population management.

What do learners need to demonstrate?	**Skills**
Introductory meeting of a species: • assess the risks of introducing animals. Individual suitability: • health assessing individuals • observing behaviour of individuals prior to introduction – signs of oestrus, urine testing, faecal testing, temperature monitoring • recognising when individuals are not suited. Practical set up: • demonstrate training on use of equipment, animal handling • set up neighbouring enclosures and 'escape' routes. Potential issues: • knowing at which point to intervene • contingency planning of poor introductions. Structured reports for the conservation and population management of a species: • introduction • conservation needs • population management • ethical considerations • conclusion • references.	CSC, CSD, EC4, EC5

2.25 Observe, record, report and interpret the behaviour of captive or wild animals in response to a range of stimuli.

What do learners need to demonstrate?	**Skills**
Produce and use an ethogram and behaviour sampling sheets.	CSB, CSC, CSD, EC1,

Compare how life stages (neonate, juvenile, adult (working, breeding), senior, geriatric) affect behaviour. Develop enrichment. Identify typical and atypical behaviour to a stimulus.	EC2, EC3, EC4, EC5

Performance outcome 3

3. Plan for and manage the good health and welfare of animals

Learners must develop knowledge about a range of mammals, birds, reptiles, amphibians, aquatics and invertebrates.

Knowledge criteria

Animal husbandry and welfare

3.1 Animal welfare **legislation** and **regulation**.

Range:
Legislation and regulation – Animal Welfare Act 2006, Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Department for Environment, Food and Rural Affairs (DEFRA) Codes of Practice, Control of Dogs Order 1992, Dangerous Dogs Act 1991, Dangerous Wild Animals Act 1976, Genetic Technology (Precision Breeding) Act 2023, Microchipping of Cats and Dogs (England) Regulations 2023, The Animal (Scientific Procedures) Act 1986, Veterinary Surgeons Act 1966, Veterinary Medicine Regulations 2013, Welfare of Animals (Transportation)(England) Order 2006, Welfare of Farmed Animals (England) Regulations 2007, Wildlife and Countryside Act 1981, Zoo Licensing Act 1981, Zoonoses Order (Amendment) (England) 2021.

What do learners need to learn?	**Skills**
The aims and purposes of relevant (and current) legislation and regulation that applies to the animal management sector and related to the health and welfare of animals. Understand the responsibilities of different stakeholders under different pieces of legislation and regulation: • staff • public. Consequences of not adhering to legislation and regulation: • employer (fines, prosecution, public perception, neglect of duty of care to animal) • employee (risk to safety, health and welfare, potential injury, neglect of duty of care to animal, loss of job) • animals (risk to safety, health and welfare, potential injury, neglect of duty of care to animal).	EC4, EC5

3.2 Animal husbandry and the **five welfare needs** and **five welfare domains**.

Range:
Five welfare needs – The need for a suitable environment, the need for a suitable diet, the need to express normal behaviour, the need to be housed with or apart from other animals, the need to be protected from pain, injury, suffering and disease.
Five welfare domains – Nutrition, physical environment, health, behavioural interactions, mental state.

What do learners need to learn?	**Skills**
The importance of following the five welfare needs: • to prevent unnecessary animal suffering • to maintain health and welfare of the animal • to comply with current legislation. The need for a suitable environment: • temperature, lighting, humidity, ventilation and their importance for endotherms and ectotherms • housing (size, materials) • substrate and bedding • location of environment • security • stocking density • accommodation plans • adapt accommodation for life stage and reason for housing – boarding, selling, breeding, conservation, education, research, veterinary. The need for a suitable diet: • food and water requirements – quality, quantity, type, supplements, treats • feeding plans • presentation of food to suit species (bowl, scatter, forage, live) • adapted for life stage and lifestyle – working animals, pregnancy and lactation, juvenile, geriatric • adapted for disease or disorders – gastrointestinal disorders, diabetes, obesity, underweight, malnutrition, kidney/liver disease. The need to express normal behaviour: • exercise needs including type, frequency and quantity, environment • enrichment • food presentation to encourage natural feeding/foraging behaviour • stereotypical behaviours and how to prevent them. The need to be housed with or apart from other animals: • solitary or social animals • intra-species interactions.	CSC, CSD, EC4, EC5

The need to be protected from pain, injury, suffering and disease: • grooming and bathing including practical methods and equipment used as appropriate to species • safety of environment • regular health assessments and weight checks/Body Condition Scoring (BCS) • veterinary care – routine checks and medical treatment • preventative care – parasite control, vaccination, foot care • biosecurity measures • quarantine and isolation procedures, barrier nursing • prevention of stress. Implications of not following the five welfare needs: • fines and prosecution • neglect of duty of care to animal • possible injury or poor health to the animal. Principles of the five welfare domains, how they help to determine animal welfare status and how they differ from the five needs. Assessment of quality of life of the animal and end of life/euthanasia: • methods of euthanasia/culling and animal welfare implications at end of life • ethical considerations for euthanasia/culling.	

3.3 Animal husbandry **plans**.

Range:
Plans – ID sheets and social grouping, animal introduction procedures, history of species and natural behaviours, accommodation design, cleaning and maintenance schedules, feeding plan, exercise and enrichment plan, medical history and health care plan, records of treatments and routine care, handling records, health and safety.

What do learners need to learn?	**Skills**
The importance of a husbandry plan: • for staff to follow • for consistency to the animal • to ensure good welfare. Formulation of a husbandry plan in line with current legislation and regulation to include: • health and safety when working with the species and how it relates to the health and welfare of the animal • history of species and natural behaviours – domestication, natural behaviour, natural diet, natural environment • ID sheets and social grouping – each individual identification,	CSC, CSD, EC4, EC5

housing ratios, social or solitary • accommodation design and records – labelled diagram of accommodation, records of environmental parameters, costs to materials • cleaning and maintenance schedules – how and when to clean, how and when to maintain, prevention of spread of disease • feeding plan – feeding and watering, food presentation, dietary needs and supplements, average weekly feeding plan • exercise and enrichment plan – type, frequency, quantity, environmental enrichment, average weekly plan • handling methods and records • medical history and health care plan – grooming needs, appropriate equipment, health assessment and a list of possible common issues with the species, medical issues for the animal, preventative care, zoonotic and notifiable diseases to be aware of for the species • records of treatments and routine care – health assessments, behaviour records, parasite treatment, medications, vaccinations, BCS/weight, foot care • handling records • animal introduction procedures. Circumstances when a husbandry plan may require changing and the importance of amending the plan: • due to life stage, disease or emergency situations.	

Nutrients

3.4 Nutritional **requirements** and formulating feeding **plans**.

Range:
Requirements – Proteins, carbohydrates (soluble and insoluble (fibre)), lipids, vitamins, minerals, water, changes due to life stage.
Plans – Feed items and ingredients, quality of foodstuffs, nutritional value of diets, Gross Energy (GE), Digestible Energy (DE), Metabolizable Energy (ME), Resting Energy Requirements (RER), Basal Metabolic Rate (BMR), rations.

What do learners need to learn?	**Skills**
Changes in nutritional requirements due to life stage: • pregnancy and lactation – when to feed more, importance of particular nutrients (protein, calcium) • geriatric – when to feed less, importance of lower requirements (lipids) • working – how to feed (little and often), specific requirements (high energy) • juvenile – feeding intervals, specific requirements (protein). Feed items and ingredients: • range and suitability of different animal feeds and their ingredients	CSC, CSD, EC4, EC5, MC1, MC2, MC4

(concentrate feeds, straight feeds, supplementary feeds)
- range and suitability of supplements.

The amounts and content of food to give to an animal and how to formulate a ration:

- amounts of feed to give
- how rations impact body condition scoring
- energy intake equals energy expenditure.

The quality of foodstuffs and the consequences of feeding poor quality food:

- look, smell, best before dates (effect on nutritional value)
- importance of stock rotation and storage
- toxicity
- poor quality – effects on health and yield.

The differences in the nutritional value of dry and wet diets:

- the use of nutritional information tables.

The differences between Gross Energy (GE), Digestible Energy (DE), Metabolizable Energy (ME) and calculation of each.

The use of formulae for Resting Energy Requirements (RER) and Basal Metabolic Rate (BMR):

- differences between them and how to apply calculations
- RER (over 5kg) = (30 x bodyweight in kg) + 70kcal
- RER (under 5kg) = (60 x bodyweight in kg)
- $BMR=M^{0.75}$ - where M is the mass in kg.

Reasons why BMR may change and how rations should be changed to match needs:

- life stage, pregnancy, lactation, medical issues, torpor, hibernation.

Animal diseases

3.5 Assessing visual, **physical** and **behavioural** indications of animal health.

Range:
Physical – Eyes (antennae), mucous membranes, ears, nose (gills, spiracles), mouth (gums, teeth, beak, tongue), coat and skin (scales, skin, feathers, shells, lateral lines), BCS, limbs (wings, fins, legs, feet, claws, hooves, nails, antlers, horns), tail, anogenital region (vulva, penis, testicles, anus, cloaca), movement/gait, Temperature/Pulse/Respiration (TPR), Capillary Refill Time (CRT), appetite and water intake, muscle condition scoring.
Behavioural – Typical/atypical, inter/intraspecies interaction, social/solitary, away from the 'norm'.

What do learners need to learn?	**Skills**
The importance of visual and physical health checking in a logical order (starting at eyes, leaving contaminated areas until the end): • prevention of cross-contamination • thoroughness and avoidance of missing things. How behaviour may change dependent on the health and life stage of the animal. Health-testing mechanisms, reasons for use and how they are carried out: • blood test • cheek swab • faecal test • urine test • saliva test • skin scrapes • feather/hair testing • genital swab • tissue collection/biopsy • semen testing • ECG, blood pressure • diagnostic imaging (ultrasound, x-ray, endoscopy, CT, MRI). Recording animal health on a health check form or husbandry plan: • animal identification details • date and time of observation • weight of animal • previous history (medication, breeding, allergies) • medications and adverse reactions • behaviour/temperament • general demeanour • general health • diet • urination/defecation/vomiting • exercise • veterinary records.	EC4, EC5, DC1, DC2

3.6 Medicine **types,** storage and **administration**.

Range:

Types – Anti-inflammatories, antibiotics, anti-parasitic/anthelmintic, analgesia, vaccinations, anaesthetics, POM-V, POM-VPS, NFA-VPS, AVM-GSL.

Administration – Enteral (oral, rectal), parenteral (topical), parenteral (subcutaneous, intramuscular, intravenous), inhalation, first aid, legal requirements.

What do learners need to learn?	**Skills**

The different types of animal medication used and the situations and scenarios they may be required in:
• medication types (anti-inflammatories, antibiotics, anti-parasitic/anthelmintic, analgesia, vaccinations, anaesthetics)
• adverse reactions and effects of inappropriate use.
 	
The processes in managing and storing veterinary medicines and why correct storage is required:
• medicine types (POM-V, POM-VPS, NFA-VPS, GSL-VPS, AVM-GSL)
• controlled drugs storage
• suitably qualified person (SQP)
• stock (stock levels, ordering, storage, recording).
 	
Techniques used to administer medicines and their suitability for different purposes/when they may be used:
• enteral (oral antibiotics or pain killers, rectal suppositories such as seizure meds)
• topical parenteral (topical anti-parasite treatments or antifungal creams)
• parenteral (subcutaneous vaccinations or pain relief, intramuscular steroids or anti-inflammatories, intravenous pain relief or analgesia)
• inhalation (live vaccine such as kennel cough).
 	
Legal requirements of medical treatments/first aid that can be undertaken by non-qualified staff:
• consequences for carrying out procedures that are not licensed (breach of legislation, fines, prosecution)
• schedule 3 of the Veterinary Surgeons Act 1966.
 	
Diagnosis by a vet of medical conditions:
• physical examination
• checking history
• laboratory testing
• diagnostic imaging.
 	
Aims and rules of first aid:
• Aims:
  ○ Preserve life
  ○ Prevent suffering
	CSB, CSC, CSD, EC3, EC4, EC5, DC2

    - Prevent the situation from deteriorating
- Rules:
    - Assess the situation
    - Maintain airway
    - Control bleeding
    - Get help.

Components of a first aid kit and when and why they are used:

- bandages (non-conforming, conforming)
- cotton wool
- sterile dressings
- tape
- thermometer
- plastic tweezers
- gloves
- round-ended scissors
- saline solution
- poultice
- contact details for vets
- carrier bag
- blanket
- farriery equipment for large species.

Appropriate first aid for common situations:

- shock and differences between different types (haemorrhagic, neurogenic, anaphylactic, cardiogenic, septic)
- Road Traffic Collision (RTC)
- convulsions and seizures
- fractures
- wounds (incision, laceration, superficial, puncture, contusion)
- dislocation
- choking
- poisoning
- burns and scalds
- bites and stings
- foreign bodies
- haemorrhages.

3.7 The veterinary **practice**, **roles** within it and veterinary **terminology**.

Range:

Practice – Waiting area, reception, consultation rooms (vet and nurse), kennel area, preoperative prep rooms, theatre, diagnostics and imaging (x-ray, ultrasound, MRI), storage, exercise area, waste disposal/freezers, isolation, pharmacy, laboratory, staff areas, food prep area, euthanasia room, extra areas for non-pet species, large animal centre considerations (stables, paddocks)

Roles – Veterinary surgeon, head veterinary nurse, registered veterinary nurse, practice manager, animal care assistants, student veterinary nurse, student veterinary surgeon, receptionist, lay people.

Terminology – Anatomical directional terms (caudal, cranial, ventral, dorsal, palmar, plantar, distal, proximal, rostral, medial, lateral), common prefixes and suffixes (dys-, -itis, -osis, -otomy, -ectomy), common veterinary abbreviations (Road Traffic Collision (RTC), Temperature Pulse Respiration (TPR), No Abnormality Detected (NAD), Bright Alert Responsive (BAR)).

What do learners need to learn?	**Skills**
The layout of the veterinary practice within different types of veterinary practices: • small animal • large animal • equine • exotic • mixed • referral • hospitals • surgery/clinics • training practices. How the layout of a vet practice contributes to welfare of the animals during their journey through the practice and management of their condition. How different types of practice may work and referral mechanisms: • private versus charity • referrals to hospitals. The role of the Royal College of Veterinary Surgeons (RCVS) in approving training practices, practice standards and checks, and the RCVS register of veterinary surgeons and the RCVS register of veterinary nurses. The responsibilities of the different job roles in a veterinary practice, including who is responsible for diagnosis, treatment and management of animals. Hospitalisation protocols for animals in a veterinary practice: • consent forms • record keeping (animal, medication) • monitoring forms • euthanasia consent/cremation procedure • in-patient protocols.	CSB, EC4, EC5

3.8 **Pathogens** and animal **diseases** and **disorders** at different **life stages**.

Range:
Pathogens – Bacteria, fungi, virus, prion, protozoa, parasites.
Diseases – Bacterial, fungal, viral, protozoan, prion, parasitic.
Disorders – Nutritional, endocrine, metabolic, physical.
Life stages – Neonate, juvenile, adult (working, breeding), senior, geriatric.

What do learners need to learn?	**Skills**

How pathogens grow and reproduce and their impact on bodily systems:
• effect of toxins on tissues and cells
• effects on homeostatic mechanisms
• organ failure.
 	
For each disease and disorder consider:
• the root cause
• symptoms
• methods of transmission (direct, indirect, airborne, inhalation, droplet, ingestion, vector, fomite) and minimisation of spread
• disease control/prevention (isolation, quarantine, barrier nursing, PPE, biosecurity, culling)
• reporting procedures and requirements
• management of wild populations – rats, badgers, rabbits, foxes (reservoir hosts).
 	
Typical diseases that are notifiable and zoonotic:
• definition of zoonotic, anthroponotic and notifiable
• the role of the Department for Environment, Food and Rural Affairs (DEFRA) and Animal and Plant Health Agency (APHA)
• legal requirements for notifiable diseases
• prevalence of disease in different geographical areas
• the process involved with reporting and managing notifiable and zoonotic diseases
• which biological systems they may affect.
 	
Typical disorders in domestic animals including nutritional, endocrine and metabolic.
• Nutritional disorders and disease:
  ○ Vitamin and Mineral deficiency or excess
  ○ Rickets
  ○ Metabolic Bone Disease (MBD)
  ○ Scurvy
  ○ Anorexia
  ○ Obesity
  ○ Urolithiasis
  ○ Laminitis
  ○ Equine Metabolic Syndrome (EMS)
	EC4, EC5

- Protein deficiency (taurine and arachidonic acid).

- Endocrine disorders:
  - Cushings
  - Addisons
  - Hypo/hyperthyroidism.
- Metabolic disorders:
  - Diabetes mellitus
  - Rumination disorder, ketosis, acidosis
  - Milk fever/eclampsia.
- Physical disorders:
  - Displaced abomasum
  - Egg binding
  - Arthritis.

Growth and reproduction of pathogens and their transmission, prevention and control:

- Bacterial diseases:
  - Leptospirosis
  - Brucellosis
  - *Tuberculosis*
  - *Salmonella*
  - Anthrax
  - *Campylobacter*
  - *E. Coli*
  - *Bordetella bronchiseptica*
  - Tetanus
  - Cat scratch fever
  - Lyme's disease
  - Psittacosis.
- Viral diseases:
  - Distemper
  - Parvovirus
  - Influenza (canine, feline, equine, avian, swine)
  - Feline herpes virus
  - Feline calicivirus
  - Feline leukaemia
  - Feline Immunodeficiency Virus (FIV)
  - Feline Infectious Peritonitis (FIP)
  - Infectious canine hepatitis
  - Myxomatosis
  - Rabbit Haemorrhagic Disease (RHD)
  - Rabies
  - Bluetongue
  - Foot and mouth
  - Newcastle disease
  - Equine Infectious Anaemia (EIA).
- Fungal diseases:
  - Ringworm
  - Chytridiomycosis

○ Aspergillosis. • Prion diseases: ○ Bovine Spongiform Encephalopathy (BSE) ○ Feline Spongiform Encephalopathy (FSE) ○ Scrapie ○ Chronic wasting disease. • Protozoan disease: ○ Giardia ○ *Toxoplasma gondii* ○ *Leishmania*. Parasites and their life cycles: • Endoparasites (roundworms, tapeworms, protozoa, flukes) • Ectoparasites (ticks, fleas, lice, mites). Core vaccinations: • Dogs (canine distemper virus, canine parvovirus, leptospirosis, canine adenovirus) • Cats (feline herpes virus, feline calicivirus, cat flu (feline parvovirus, feline infectious enteritis, feline panleukopaenia)) • Rabbits (myxomatosis, rabbit viral haemorrhagic disease) • Equids (equine influenza, tetanus). Non-core vaccinations: • Dogs (rabies, kennel cough/*Bordetella bronchiseptica*, canine parainfluenza virus) • Cats (feline chlamydophilosis, feline leukaemia virus, rabies) • Equid (equine herpes virus, equine strangles/*streptococcus equi*, equine viral arteritis).	

Skills

3.9 Identify and assess severity of and report potential health issues in animals.

What do learners need to demonstrate?	**Skills**
Carry out health assessments using techniques appropriate to species and consideration of animal needs. Visual health assessment: • correctly identify animal needed for the check • assess animals' mobility and gait • monitor animals' behaviour • monitor animals' life signs (breathing) • check coat condition, external swelling, discharge • check animals' accommodation for signs of illness (blood, vomit, diarrhoea).	CSA, CSB, CSC, CSD, EC1, EC2, EC3, EC4, EC5, EC6, MC1, DC1, DC2

Physical health assessment: • measure pulse • determine animals' temperature (considering animal welfare) • check animals' body parts (eyes, ears, mouth, nose, body, limbs/appendages, anogenital region) • check animals' coat (skin, scales, fur, feathers) for signs of disrepair/damage/parasites/injury • measure animals (body condition score, weight, muscle condition score, faecal scoring). Complete and accurately record animal information and data regarding health assessment. Store animal records and information in line with relevant legislation and regulation. Monitor changes in animal health over time and report findings. The principles of pain scoring and how it can be used in animal health assessments and monitoring. Be able to recognise when veterinary treatment is needed. Be able to recognise when euthanasia is the most suitable option for an animal.	

3.10 Identify and assess the need for basic treatments and preventative care.

What do learners need to demonstrate?	**Skills**
Follow appropriate processes and procedures to administer treatment relevant to species as instructed by the handler: • identify when first aid is necessary • ensure cleanliness of a wound (remove discharge/debris) • apply a dressing and bandage to an animal (foot, limb, ear/head, abdomen, tail) • apply topical medical treatments • administer oral medical treatments (tablets, syringe) • demonstrate basic first aid techniques (bee and wasp stings, burns and scalds, collapse, hypo/hyperthermia, fits and seizures, shock). Complete records following treatment and undertake ongoing monitoring to assess the effectiveness of treatment plans. Carry out preventative care techniques as appropriate to species and consideration of animal health and welfare needs: • parasite control (identification, methods, timings) • grooming and the need for professional groomers (trimming, bathing/cleaning, brushing, checking for parasites) • hoof/feet maintenance (nail/claw/hoof trimming and care).	CSB, CSC, CSD, EC1, EC2, EC3, EC4, EC5, DC1, DC2

3.11 Interpret nutritional information and modify diets for animals.

What do learners need to demonstrate?	Skills
Use nutritional values tables and feed packaging to formulate rations for animals as part of a husbandry plan. Creation of feeding plans: • weekly or monthly feeding plans and what to include (feed, method, presentation, frequency, supplements, timing) • how these may change due to life stage • how the method of feeding relates to the species (natural behaviours) • how the feed type relates to the digestive system. Measure and prepare food appropriate to the animal and modify the ration when necessary: • changes to life stage • changes to animal health • changes to animal body condition. Monitor and record food and water intake, where possible and evaluate the diet to include the effect of the diet on animal health (body condition, weight, behaviour, coat condition, faecal quality).	CSC, CSD, ECEC4, EC5, MC1, MC2, MC4, DC1, DC2, DC4

Performance outcome 4

4. Carry out safe animal handling practices

Learners must develop knowledge about a range of mammals, birds, reptiles, amphibians, aquatics and invertebrates.

Knowledge criteria

4.1 **Legislation and regulation** surrounding the handling of animals.

Range:
Legislation and regulation – Animal Welfare Act 2006, Animal Welfare (Sentience) Act 2023, Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), DEFRA Codes of Practice, Control of Dogs Order 1992, Dangerous Dogs Act 1991, Dangerous Wild Animals Act 1976, Genetic Technology (Precision Breeding) Act 2023, Firearms Act 1968, Health and Safety at Work Act (HASAWA) 1974, Manual Handling Operations Regulations 1992, Microchipping of Cats and Dogs (England) Regulations 2023, Personal Protective Equipment (PPE) Regulations 1992, Secretary of State's Standards of Modern Zoo Practice (SSSMZP), Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013, The Animal (Scientific Procedures) Act 1986, Veterinary Surgeons Act 1966, Veterinary Medicine Regulations 2013, Welfare of Animals (Transportation) (England) Order 2006, Welfare of Farmed Animals (England) Regulations 2007, Wildlife and Countryside Act 1981, Zoo Licensing Act 1981, Zoonoses Order (Amendment) (England) 2021.

What do learners need to learn?	**Skills**
The aims and purposes of relevant (and current) legislation and regulation that applies to the animal science sector and related to the safe handling of animals. The responsibilities of different stakeholders under different pieces of legislation and regulation: • staff • public. Consequences of not adhering to legislation and regulation: • employer (fines, prosecution, public perception, neglect of duty of care to animal) • employee (risk to safety, health and welfare, potential injury, neglect of duty of care to animal, loss of job) • animals (risk to safety, health and welfare, potential injury, neglect of duty of care to animal).	EC4, EC5

Health and safety

4.2 **Hazards** and **risks** of handling animals and **high-risk** situations.

Range:

Hazards – Lone working, hazardous materials, equipment, uneven ground, inclement weather, chemicals, other people, movement of animals, unpredictable animal behaviour, handling of animals, poisonous plants, working at heights, radiation, anaesthetic gases, zoonotic disease, biohazards, contact with machinery and equipment.

Risks – Zoonoses, crushing, kicking, biting, contamination or asphyxiation by hazardous materials, slips, trips and falls, drowning, allergens (animal, environmental).

High-risk:

Animals – Dangerous dogs, category 1 species, large animal species, zoonotic disease, injured/sick animals, feral/wild animals, rescue/rehabilitation animals.

People – Pregnancy, immunocompromised, injured, work experience, lack of experience, anthroponotic disease, disabilities.

What do learners need to learn?	**Skills**
Risks and hazards of working with animals and how to keep safe in high-risk situations. Creating, using, reviewing and updating risk assessments as necessary. Safe working practices around animals when handling them: • manual handling – use of equipment • recognising your own limitations • PPE • Standard Operating Procedures (SOPs) • public safety • communication • spotters/paired working/lone working • appropriate training procedures – initial and frequency • radiation safety and anaesthetic gases in veterinary environments • allergens – dander and dust.	CSC, CSD, EC1, EC3, EC3, EC4, EC5, DC1, DC2

Handling animals

4.3 **Reasons** and **techniques** for handling animals.

Range:

Reasons – Medical procedures (veterinary, administering medications/treatments), routine procedures (health assessing, grooming, cleaning accommodation, exercise, training, foot care), showing or competition, working, feeding, relocation, rescue and rehabilitation, sale and slaughter/culling/euthanasia.

Techniques – Physical restraint (manual, equipment), chemical, with assistance, cat-friendly, dog-friendly, fear-free.

What do learners need to learn?	Skills
The different reasons for handling and restraining animals and how handling may need to be adapted dependent on the reason for handling. How to ensure all handling is safe and welfare-orientated. How planning for handling animals helps to avoid issues during handling and ensures a welfare-based approach: • training animals for handling • three Rs – Replacement, Reduction, Refinement • humane slaughter/culling methods • awareness of animal health/injury/behaviour • accessibility • equipment availability and preparation • human safety in difficult scenarios – injured animals • welfare considerations • assessing temperament and behaviour • identification of correct equipment and its use.	CSC, CSD, EC4, EC5

4.4 **Equipment** for handling and moving animals.

Range:
Equipment:
Large animals – Crush, hurdles, pig boards, race, stocks, twitch, bull rings, halters/headcollars, lead lines/ropes.
Domestic animals – Muzzle, catch pole, cat bag, crush cage, collar and lead, blankets and towels, gauntlets, pet carriers, snake hooks, halters, nets.
Avian animals – Net, towel, bag, gauntlet, falconry equipment, swan bags
Exotic animals – Snake hooks, gauntlets.

What do learners need to learn?	Skills
Identification of equipment used to handle animals, reasons and limitations of their use. Effective use of equipment and the effects of these on animal health and welfare: • inappropriate use and injury to animal • inappropriate use and injury to human • damage to property • damage to equipment • incorrect selection of equipment • unsafe equipment and unsafe use of equipment • limited training • mental/physical effects on animals. How to maintain equipment and recognise when it should be replaced.	CSC, CSD, EC4, EC5

Chemical restraint methods when they may be suitable and the benefits and limitations of each: • anaesthetic • sedation • dart guns.	

Movement of animals

4.5 **Considerations** for moving animals.

Range:
Considerations – Health and safety legislation/regulation, documentation, passports, life stages, pregnancy, physical problems (illness, injury, lameness), sexes, species specifics (social requirements, animal temperament), condition and availability of transport and equipment, environmental conditions (humidity, lighting), timing/duration, safety and security of the area/equipment/transport, available personnel and their skills/knowledge.

What do learners need to learn?	**Skills**
The different reasons for moving animals and how movement of animals may need to be adapted dependent on the reason for moving. Advantages and disadvantages of different methods of moving and transporting animals and how to minimise stress and promote good welfare: • suitable preparation of the vehicle – substrate, cleanliness, angle of the ramp, safety and security, environmental controls, ventilation, drainage, stocking density/size • food and water provision for long journeys (over eight hours) • training of animals (desensitisation) • trained staff • adjustment of techniques to minimise injury • technique appropriate for species and individual • reasons for moving • holding enclosures – carriers, size, materials, species suitability, environmental controls. Effects of different transportation considerations on animal health and welfare: • injury to animal and/or human • stress to animal • death • dehydration • malnutrition • incorrect stocking densities/poor cleanliness lead to proliferation of disease. How movement and transportation of animals is carried out to minimise	CSC, CSD, EC4, EC5

stress to the animal.

Animal environments

4.6 **Types** and **purposes** of accommodation and their suitability for species.

Range:

Types:

Large mammal – Stable, field, barn, sow pens, farrowing pens, pigsty, cubicles, free range, zoo enclosures, provisions for dangerous species.

Small mammal – Kennel, runs, hutches, cages, vivariums, terrariums.

Avian – Aviaries, perches, mews, cages, coops, enriched cages, free range, pigeon lofts, dove cotes.

Reptile and amphibian – Vivariums, bioactive, tanks, tortoise tables, terrariums, ponds, provision for venomous species.

Aquatic – Tanks, marine, freshwater, tropical, aquaponics, pond.

Invertebrate – Bioactive, terrarium, vivarium, lepidopterarium.

Veterinary – Cages, walk-in kennel, cattery, kennels, exotics, individually ventilated.

Rescue and rehabilitation – Species-specific to reduce human animal interaction, soft release, hard release, long-term, short-term.

Boarding – Kennels, catteries/chalets, other species boarding.

Purposes – Short-term (pet stores, boarding), medical (veterinary, quarantine, isolation), rescue and rehabilitation (domestic, wildlife), permanent (zoo, farm, breeding, enclosures, pets).

What do learners need to learn?

General accommodation design principles, why they are important and how they are species specific:

- barriers – fences, hedges, doors, double doors, access considerations, gates, moats, sneeze barriers, visual barriers
- general principles of quarantine and isolation facilities for all species
- fixtures and fittings – lights, water bowls, troughs, feeding stations, drainage, windows, hides, doors
- environmental conditions – ventilation, lighting, humidity, temperature, hygiene, noise, enrichment, water quality and pH
- safety and security of accommodation
- cost to build.

The practical implications of different materials for different species when housing animals.

Methods of meeting animal welfare needs in accommodation and their advantages and disadvantages:

- construction materials – type, sustainability, cost, ease of cleaning, availability, durability, species suitability, fixtures and fittings, eco friendly

Skills

CSC, CSD, EC4, EC5, MC1, MC9, DC1, DC2, DC4

- substrates and bedding
- space allowances, stocking density and exercise considerations
- enrichment provision
- safety and security
- maintenance, hygiene and biosecurity.

How natural habitat types affect the accommodation design:

- terrestrial
- aquatic
- semi-aquatic
- fossorial
- arboreal.

The importance of enclosure design for staff and its effect on animal welfare:

- ease of cleaning
- safety
- location
- proximity to water sources
- waste disposal facilities.

The importance of enclosure design for visitors and its effect on animal welfare:

- viewing areas
- animal interaction
- cleanliness
- space
- accessibility.

4.7 Considerations for accommodation **cleaning** and **maintenance**.

Range:
Cleaning – Spot cleaning, deep cleaning, disinfecting, frequency, safe cleaning agents, waste disposal, equipment.
Maintenance – Hazards to humans and animals, durability of materials, equipment maintenance, safety and security.

What do learners need to learn?
Methods for cleaning animal accommodation and when different methods may be used:

- protocols of different establishments
- placement of animals during cleaning
- when and how to use disinfectant (including ratios and contact time) and sterilisation.

Hazards in accommodation when maintenance is required and the frequency of checks:

- removal of hazards – barbed wire, broken locks, toxic plants,

Skills
CSC, CSD, EC4, EC5

foreign objects • maintenance schedule. How cleaning and maintenance affects the health and welfare of the animal.	

Skills

4.8 Work safely when handling and housing animals.

What do learners need to demonstrate?	Skills
Follow current or relevant health and safety legislation and regulation and workplace policies: • demonstrate health and safety • correctly use PPE • create a risk assessment • follow Standard Operating Procedures (SOPs). Assess risk and respond according to level of risk: • identify hazards • create risk assessments • carry out control measures for hazards • consider lone working and associated risk. Monitor risks in line with safe working practices: • regular review and update of risk assessments.	CSC, CSD, EC1, EC2, EC3, EC4, EC5, DC1, DC2

4.9 Create plans for and select equipment and handling methods relevant to specific situations and species.

What do learners need to demonstrate?	Skills
Use animal equipment correctly: • species–specific • safe and maintained. Approach animals correctly: • calm and confident • be aware of fight or flight response • assess animal behaviour. Correctly handle and restrain animals: • species-specific • life stages • health and safety • PPE. Adapt animal handling techniques based on environmental situations:	CSB, CSC, CSD, EC1, EC2, EC3, EC4, EC5, DC1, DC2

• dangerous wild animals • category 1 species • injured animals • emergency situations • pregnancy. Correctly move animals: • moving equipment • prevent stress. Create animal husbandry plans and records needed for animal movements.	

4.10 Apply appropriate pressure and dexterity when handling animals.

What do learners need to demonstrate?	**Skills**
Demonstrate physical dexterity and delicacy when interacting with animals: • safe and correct animal handling • calm and confident approach • firm but not forceful pressure • use of restraint equipment where required. When moving animals: • preventing escape • preventing injury • approaching calm and confidently. When preparing animals for transportation: • suitable transportation.	CSC, CSD, EC4, EC5

4.11 Select the most appropriate methods of successfully transporting animals.

What do learners need to demonstrate?	**Skills**
Consider the appropriateness of transport methods when moving animals: • species • level of risk • duration • animal welfare • health and safety • legislation.	CSC, CSD, EC4, EC5

4.12 Designing accommodation for different stakeholder needs.

What do learners need to demonstrate?	**Skills**
Evaluation and justification of choices for the design elements including the advantages and disadvantages of each: Animals: • welfare needs. Keepers: • husbandry • access • safety • visibility. Vet team: • access • visibility • safety • quarantine. Visitors: • visibility • safety • welfare needs • aesthetics. Educators: • visibility • safety • welfare needs • aesthetics • information signs. Researchers: • visibility • safety • welfare needs • aesthetics • access. Evaluate existing accommodation provision within husbandry plans in terms of suitability for the stakeholders.	CSC, CSD, EC4, EC5

Performance outcome 5

5. Plan, perform, record and communicate findings of scientific investigations in animal science

Knowledge criteria

Investigation

5.1 **Legislation and regulation** in animal science investigations.

Range:
Legislation and regulation – Animal Welfare Act 2006, Animal Welfare (Sentience) Act 2023, Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018, Control of Substances Hazardous to Health (COSHH) 2002, Controlled Waste Regulations 2012, Drugs Act 2005, Genetic Technology (Precision Breeding) Act 2023, Health and Safety at Work Act 1974, Health and Safety (Safety Signs and Signals) Regulations 1996, Firearms Act 1968, Misuse of Drugs Act 1971, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013, The Animal (Scientific Procedures) Act 1986, Veterinary Medicine Regulations 2013, Welfare of Animals (Transportation) (England) Order 2006, Wildlife and Countryside Act 1981, Zoonoses Order (Amendment) (England) 2021.

What do learners need to learn?	**Skills**
The aims and purposes of relevant (and current) legislation and regulation that applies to the animal science sector and related to animal science investigations. The responsibilities of different stakeholders under different pieces of legislation and regulation: • staff • public. Consequences of not adhering to legislation and regulation: • employer (fines, prosecution, public perception, neglect of duty of care to animal) • employee (risk to safety, health and welfare, potential injury, neglect of duty of care to animal, loss of job) • animals (risk to safety, health and welfare, potential injury, neglect of duty of care to animal).	EC4, EC5

5.2 **Design** and **planning** of scientific investigations.

Range:
Design – Investigation types (laboratory, fieldwork, experimental, observation) variables (dependent, independent), control groups, principles of design.
Planning – Alternative and null hypothesis, aims and objectives, methodology, data analysis and statistical tests, risk assessment, validity and reliability, equipment and resources, presentation of results, controls.

What do learners need to learn?	Skills
Principles for design of a laboratory report and which of these must feature in a scientific plan (SP) and which in a laboratory report (LR): • title (SP, LR) • aims/objectives (SP, LR) • hypothesis (SP) • introduction (SP, LR) • literature review (SP) • resources (SP) • methodology (SP) • results (LR) • discussion (LR) • conclusion (SP, LR) • Harvard referencing (SP, LR). Controls for scientific investigation: • control groups • repetition • dependent and independent variables. How to record and analyse data, use logbooks and evaluate results: • awareness of parametric and non-parametric data • data analysis and presentation of results (raw data and in final report) • mean and standard deviation • interpreting errors • measuring gradients of lines and curves on graphs • keeping to milestones and critical path analysis – Gantt charts. Methods of scientific communication, including standard format of scientific reports, scientific representation and terminology.	EC1, EC2, EC3, EC4, EC5, MC5, DC1, DC2, DC4

5.3 Safe working **methods** in laboratories.

Range:
Methods – Hazard identification and risk management, personal protective equipment (PPE), laboratory safety symbols, setting up of equipment, use of bench space, safe working policies, Good Laboratory Practice (GLP), Good Clinical Practice (GCP), working safely with chemicals, selection of correct glassware.

What do learners need to learn?	Skills
The importance of working safely in laboratories and consequences of not doing so: • Injury in a laboratory environment is likely to be severe due to chemicals or heat. • Injury to self and others is more likely to need reporting.	EC4, EC5

• There is a higher likelihood of incidents due to materials and environment. Managing the sustainability of single use items: • syringes • needles • plastics.	

Microbiology

5.4 **Hazards** in microbiology.

Range:
Hazards – Infection and zoonoses, equipment (naked flames, autoclaves, chemicals), waste disposal, spore formation, aerosol formation, illness (sepsis, resistant bacteria/superbugs), antibiotic resistance.

What do learners need to learn?	**Skills**
Procedures to minimise risk when working with microorganisms: • safety cabinets • autoclaves • not sealing plates to prevent anaerobic growth • adjust incubation temperatures to prevent growth of harmful bacteria and toxins. Antibiotic resistance: • short- and long-term affects to the animal, staff and business if a resistant disease is contracted • nosocomial transmission.	EC4, EC5

5.5 **Methods** of bacterial identification and **growth** of microorganisms.

Range:
Methods – Gram staining, shape of bacteria.
Growth – Environmental factors (temperature, pH, nutrition, oxygen requirements), selective and differential agars, broths, bacterial growth curves, asexual and sexual reproduction of fungi, viral adsorption, penetration, multiplication and release.

What do learners need to learn?	**Skills**
Differential agars and their uses. Concepts of bacterial identification, media and growth needed to carry out useful microbial investigations: • inhibition of growth – antiseptics and disinfectants, sterilisation (heat, radiation, filtration and chemical) • antibiotics including mechanisms of control and resistance	EC4, EC5

• use of reference keys for identification • gram staining • identification of common bacteria by their shape and colony distribution.	

5.6 **Techniques** in microbiology.

Range:
Techniques – Aseptic technique, isolation and classification of bacteria (streak plates, colony morphology).

What do learners need to learn?	**Skills**
Techniques used during microbial investigation: • aseptic technique • streak plates • gram-staining (gram-positive and gram-negative bacteria) • bacterial identification • culturing and incubation. How to test for effectiveness of different concentrations of disinfectants and different antibiotics on microorganisms to recommend the most effective. Efficacy of antibiotics and their properties. How to carry out microbiological investigations: • reasons for carrying out microbiology • methodology • results.	EC4, EC5

5.7 **Uses** of microorganisms.

Range:
Uses – Food technology (yoghurt, bread, cheese, silage, haylage, alcohol), pharmaceuticals (antibiotics, vitamins, probiotics, prebiotics, amino acids), animal digestion (caecum and reticulo-rumen), mediation of pollution in ecology, nitrogen fixing, genetic modification (insulin production).

What do learners need to learn?	**Skills**
The importance and uses of microorganisms in each of their roles and the advantages and disadvantages of each.	EC4, EC5

5.8 Effective use of **microscopes**.

Range:
Microscopes – Light, transmission electron, scanning electron.

What do learners need to learn?	Skills
Differences between the microscope types and when each may be used: • microscope structure • microscope set up • microscope strengths. Recognition of histological and cytological samples by shape of cell and nucleus, granulation and staining: • tissues – epithelium, nervous, connective, muscle • cells – erythrocytes, leucocytes, spermatozoa • shapes of bacteria – spherical, rod, spiral, corkscrew. Preparation techniques for samples and the advantages and disadvantages of each: • fixation • embedding • sectioning • staining • haematoxylin and eosin staining • Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM) samples.	EC4, EC5, MC1

Biochemistry

5.9 Acids, bases and associated **theories**.

Range:
Theories – Bronsted-Lowry theory, Hess's law, Henderson-Hasselbalch equation.

What do learners need to learn?	Skills
Acids and bases and use indicators to identify the pH: • universal indicator • paper indicators (litmus). Process of ionisation and dissociation, movement of hydrogen ions and calculation of pH and pOH: • dissociation constants Ka and pKa. How to determine the endpoints of reactions using simple acid or base titration: • strong acid versus strong base • weak acid versus strong base • strong versus concentrated acids • selection of pH indicators for titration • alternative ways of determining the endpoint.	EC4, EC5, MC4

How to carry out titrations: • reasons for carrying out titrations • methodology • results.	

5.10 **Rates of reaction** and catalysts.

Range:
Rates of reaction – Thermodynamics, entropy, enthalpy, buffers, activation energies.

What do learners need to learn?	**Skills**
Factors affecting rate of reaction: • chemical (concentration, particle size/surface area, bond strength, enzyme action, catalysts, presence of inhibitors) • environmental (temperature, pH, pressure). The use of buffers and their effects on reaction: • buffer solutions and buffering • effect of pH on amino acids • Zwitter ion formation. How to measure rates of reaction using chemical and biological catalysts: • thermodynamics • entropy • order of reaction – 0/1st/2nd • enthalpy as a function of state • enthalpy changes (combustion, neutralisation) and links to bond formation and breakage • calorific values of food • homogenous and heterozygous catalysts • activation energies • Maxwell-Boltzmann distribution.	EC4, EC5, MC4

5.11 How enzymes and their **properties** can be used in reactions.

Range:
Properties – Action, inhibition and control, lock and key, induced fit, competitive and non-competitive, reversible and irreversible, denaturation.

What do learners need to learn?	**Skills**
Action, inhibition and control of enzymes in cells and their effects on metabolic rate. Lock and key and induced fit models, with reference to catabolic and anabolic enzyme reactions.	EC4, EC5

Competitive, non-competitive, reversible and irreversible inhibition and their effects on velocity of reaction. Effects of denaturation on enzyme activity: • change in the receptor site structure – lock and key will not fit • break hydrogen bonding down – prevent catalysation • change the shape of the active site – decreased speed of reaction.	

5.12 Dynamic nature of **equilibrium**.

Range:
Equilibrium – Equilibrium constant, reaction quotient, Le Chatelier's principle, changes to equilibrium.

What do learners need to learn?	**Skills**
How equilibrium is achieved and determined in simple reactions: • reversible reactions • endothermic and exothermic reactions • equilibrium constant and reaction quotient • kinetic and thermodynamic views of equilibrium • Le Chatelier's principle • calculation of equilibrium constant • establishment of equilibrium. The effect of temperature and catalysts on equilibrium.	EC4, EC5, MC4

5.13 Cellular **respiration**.

Range:
Respiration – Glycolysis, link reaction, citric acid cycle, oxidative phosphorylation, Adenosine Triphosphate (ATP) yields.

What do learners need to learn?	**Skills**

• The location in the cell of each step of cellular respiration, the process at each step and the ATP yields from each step:
• Glycolysis:
  ○ significance of NADH, pyruvate and water production
  ○ outline changes in number of carbon atoms and changes in phosphorylation occurs in the cytoplasm
• Link reaction:
  ○ why formation of acetyl-CoA (coenzyme A) from pyruvate is necessary
  ○ occurs in the mitochondria
• Citric acid cycle (Krebs):
  ○ entry of acetyl-CoA into cycle
	EC4, EC5

○ number of steps in a complete cycle ○ changes in numbers of carbon atoms ○ production of water, carbon dioxide, NADH, FADH2 and ATP ○ occurs in the mitochondria • Oxidative phosphorylation: ○ respiratory chain ○ electron transport chain – entry of NADH and FADH2, ATP yields ○ aerobic respiration ○ anaerobic respiration ○ occurs in the mitochondria. Lactic acid production and the conversion of lactic acid back to glucose. Principle of oxygen debt and detrimental effects of excess lactic acid in animals.	

5.14 **Atomic structure** and the **periodic table**.

Range:
Atomic structure – Protons, neutrons, electrons, mass and charge, electron shells, elements, mixtures and compounds, isotopes.
Periodic table – Groups, layout, reactivity, bonding.

What do learners need to learn?	**Skills**
The structure of an atom, charges of each and electron shell configuration. How the periodic table determines properties of elements: • reactivity • states • types of bonds formed (ionic, covalent) • number of electrons. How the structure of isotopes informs their use.	EC4, EC5

5.15 Chemical **bonding,** balancing equations and biochemical reactions.

Range:
Bonding – Covalent, ionic, metallic, intermolecular forces (Van der Waals, hydrogen bonding, dipole-dipole), hydrophilic/hydrophobic interactions.

What do learners need to learn?	**Skills**
How chemical bonds are formed between elements: • formulae notation of chemical bonds and equations • reactions between chemicals ○ balance simple chemical equations. Principles of biochemical reactions: • oxidation and reduction • hydrolysis and dehydration • transfer of functional groups – phosphate.	EC4, EC5

5.16 Organic **molecules**.

Range:
Molecules – Alkanes, alkenes, alcohols, carboxylic acids, halogenoalkanes, halogenoalkenes, aldehydes, ketone, ethers, esters, amines, amides.
.

What do learners need to learn?	**Skills**
How to name organic molecules and notate their structures. How to recognise isomers and notate their structures to show differences: • structural • positional • geometric • optical.	EC4, EC5

5.17 Mass, **molarity** and solutions.

Range:
Molarity – Avogadro's constant, basic mole calculations, testing accuracy of solutions.

What do learners need to learn?	**Skills**
Calculate concentrations of solutions, and masses: • $amount\ (mol) = \frac{mass\ (g)}{molar\ mass\ (g/mol)}$ • $Avogadros -\ 6.02\ x\ 10^{23}$. Measuring mass and liquid or gas volumes to specified accuracy, producing standard solutions and serial dilutions.	EC4, EC5, MC4

Units and conversions used in scientific investigations to ensure accuracy: • mol, dm^3, cm^3, mol dm^{-3}, g, $gmol^{-1}$. How to test accuracy of prepared solutions: • titration • mass spectrometry • colorimetric or spectrophotometric technique.	

Skills

5.18 Design and implement scientific investigations.

What do learners need to demonstrate?	**Skills**
Do single animal case studies. Plan scientific investigations. Risk assess scientific investigations. Prepare equipment lists for scientific investigations. Use variables and indicators. Use tried and tested research methods.	EC1, EC2, EC3, EC4, EC5

5.19 Analyse results and summarise findings using reporting tools.

What do learners need to demonstrate?	**Skills**
Descriptive statistics: • use of spreadsheets. Listing methods of dissemination of results including where the investigation(s) might be published: • presentation • report • scientific journal • academic posters. Consideration of the implications of findings for practices: • Produce recommendations based on findings. • Evaluate scientific investigation including evaluation of own practice.	EC1, EC2, EC3, EC4, EC5, DC1, DC2. DC4

5.20 Measure, record and present scientific information.

What do learners need to demonstrate?	Skills
Use measuring equipment accurately: perform calculations for solutions. Gather, record and present data: • Gather data from scientific investigations. • Record data in an appropriate format. • Produce scientific reports, posters, articles.	EC1, EC2, EC3, EC4, EC5, MC4, MC5, DC1, DC2, DC4

5.21 Use microscopes to make observations and identify biological specimens.

What do learners need to demonstrate?	Skills
Use microscopes correctly: • Identify the correct lens. • Use immersion oil correctly. • Focus the viewpoint. • Use magnification formulae to measure objects. Identify shapes of bacteria – spherical, rod, spiral, corkscrew. Identify tissues – epithelium, nervous, connective, muscle: • Look for structural elements and shapes of the cells. • Identify the relationship of cells to each other in tissue formation. Identify cells – erythrocytes, leucocytes, spermatozoa: • Look for structural elements and shapes of the cells.	EC4, EC5, MC3, MC4

5.22 Interpret the key features of equilibrium processes.

What do learners need to demonstrate?	Skills
• Use good experimental design to achieve results. • Produce a graph of equilibrium. • Use indicators correctly.	EC4, EC5

Guidance for delivery

The purpose of this Occupational Specialism is for learners to know and undertake the theory and practice of Animal Management and Science. A range of classroom based and practical delivery methods should be used to ensure both theory and practice are delivered with strong linkage to vocational context. Centres are encouraged to introduce employers and specific professionals from the Animal Management and Science industry to provide interesting and relevant information to the learner.

Throughout all practical tasks the focus should be on safe working. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. Adequate Personal Protective Equipment (PPE), appropriate to the learner, the equipment and the task will be provided and worn in accordance with the associated risk assessment and policies and procedures. Learners should understand the importance of maintaining an awareness of current legislation and Codes of Practice. Thought should be put on the need for biosecurity and animal health and welfare throughout. The requirement for regular maintenance and use of the manufacturers' manuals should also be identified.

For the more theory-based outcomes, it is anticipated that the delivery will be through formal lectures but it is recommended that they are linked directly with interactive lessons in a real environment and that visiting speakers are used where possible to provide a vocationally relevant context.

Wherever possible, it is expected that the learner is taught using methods and systems reflecting those used in a commercial-sized enterprise.

Suggested learning resources

Books

Animal Genetics & Breeding, Tomar, AK et al, (2015)
Published by: Daya Publishing

Animal Nutrition, Macdonald P, Greenhalgh JFD et al, (2022), 8th Edition
Published by: Pearson

Animal Restraint for Veterinary Professionals, Sheldon CC, Topel J, (2023), 3rd Edition
Published by: Elsevier

Animal Welfare, Appleby MC, Olsson A et al, (2018), 3rd Edition
Published by: Cabi Publishing

Arthur's Veterinary Reproduction and Obstetrics, Noakes DE, Parkinson TJ et al, (2018), 10th Edition
Published by: Saunders

Aspinall's Complete Textbook of Veterinary Nursing, Lakeman N, Aspinall V, (2016), 3rd Edition
Published by: Elsevier, Oxford

Behavioural Ecology; An Evolutionary Perspective on Behaviour, Danchin E, Giraldeua et al, (2008)
Published by: Oxford University Press

BSAVA Manual of Reproduction and Neonatology (BSAVA British Small Animal Veterinary Association), England, G, von Heimendahl A, (2010), 2nd Edition
Published by: BSAVA

Canine and Feline Nutrition: A Resource for Companion Animal Professionals, Case L, Daristotle L et al, (2010), 3rd Edition

Published by: Mosby
Cattery Design: The essential guide to creating your perfect cattery, Key D, (2006),
Published by: David Key Kennel and Cattery Design
Color Atlas of Veterinary Histology, Bacha JB, Bacha LM, (2012), 3rd Edition
Published by: Wiley-Blackwell
Companion Animal Care and Welfare: The UFAW Companion Animal Handbook (UFAW Animal Welfare), Yates J, (2019)
Published by: Wiley Blackwell
Companion Animal Nutrition: A Manual for Veterinary Nurses and Technicians, Ackerman N, (2008)
Published by: Butterworth-Heinemann
Encyclopaedia of Dog Breeds, Coile DC, (2015), 3rd Edition
Published by: Sourcebooks
Exotic Animal Care and Management, Judah V, Nuttall K, (2016), 2nd Edition
Published by: CENGAGE Delmar Learning
Fundamentals of Applied Animal Nutrition, Dryden G, (2021)
Published by: CABI
Handbook of Laboratory Animal Management and Welfare, Wolfensohn S, Lloyd M, (2013), 4th Edition
Published by: Wiley-Blackwell
Introduction to Veterinary Anatomy and Physiology, Aspinall V, Cappello M, (2020), 4th Edition
Published by: Elsevier Saunders
Kennel Design: The essential guide to creating your perfect kennels, Key D, Bailey G, (2008)
Published by: David Key Kennel and Cattery Design
Kennel and Kennelling: A Guide for Professional and Hobbyists, McMains JM, (2000), 2nd Edition
Published by: John Wiley & Sons
Restraint and Handling for Veterinary Technicians and Assistants, Ballard B, Rockett J, (2009), 1st Edition
Published by: Cengage
The Complete Textbook of Animal Health and Welfare, Williams J, (2009)
Published by: Elsevier/Saunders
The Dog: Its behaviour, nutrition and health, Case LP, (2005), 2nd Edition
Published by: Wiley-Blackwell
The Domestic Dog: Its evolution, behaviour and interaction with people, Serpell J, (2016), 2nd Edition
Published by: Cambridge University Press
The Essential First Aid Handbook for Dog Owners, Scott J, (2020)
Published by: Independently published
The Kennel Clubs Illustrated Breed Standards, Kennel Club, (2011), 4th Edition
Published by: Ebury Press
The Ultimate Encyclopaedia of Cats, Cat Breeds and Cat Care, Edwards A, (2023), Reissue Edition
Published by: Hermes House
Understanding Cat Behaviour, Roberts G, (2014)
Published by: CreateSpace Independent Publishing Platform
Veterinary Infection Prevention and Control, Caveney L, Jones B et al, (2011), 1st Edition
Published by: Wiley-Blackwell

What is my Dog Thinking? The essential guide to understanding pet behaviour, Baile G, (2014)
Published by: Pyramid

Websites

BIAZA – British and Irish Zoo Association
www.biaza.org.uk
CIEEM
www.cieem.net
Cat Protection
www.cats.org.uk
Department for Environment, Food and Rural Affairs
www.defra.gov.uk
Game and Wildlife Conservation Trust
www.gwct.org.uk
Global Issues
www.globalissues.org.uk
Governing Body of the Cat Fancy
www.gccfcats.org
Green Facts
www.greenfacts.org
International Cat Care (formally Feline Advisory Bureau)
icatcare.org
IUCN
www.iucn.org
Joint Nature Conservation Committee
www.jncc.defra.gov.uk
Lantra jobs in the land-based industry
www.lantra.co.uk
NASCO – North Atlantic Salmon Conservation Organisation
www.nasco.int
Naturenet
www.naturenet.net
UK Pet Food (formerly PMFA)
www.ukpetfood.org
Pet Industry Federation
www.petfederation.co.uk
Pet Owners Association
www.pet-owners.co.uk
The Atlantic Salmon Trust
www.atlanticsalmontrust.org
The British Horse Society
www.bhs.org.uk
The Ecology Global Network
www.ecology.com
The Kennel Club
www.thekennelclub.org.uk

The Marine Conservation Society
www.mcsuk.org
The Natural History Museum
www.nhm.ac.uk

Scheme of assessment additional information

The below table illustrates where the Performance Outcomes (POs) and criteria, within the Occupational Specialism (OS) content is assessed across the different assessment components.

Performance Outcome	Criteria	Assessment Component
PO1 Apply research methods to collect and analyse scientific information on reproductive technologies and gene manipulation.	1.1 Internal sources for research.	Research Project
	1.2 External sources for research.	
	1.3 The importance of confidentiality during research and legal restrictions.	
	1.4 Characteristics of reliable sources.	
	1.5 Fact, opinion and bias and their impact on research.	
	1.6 Interpreting research briefs and structuring a research project.	
	1.7 Developing and undertaking research using different methods and research design.	
	1.8 Hazards and risks associated with undertaking primary research.	
	1.9 Importance of animal research and stakeholders involved.	
	1.10 Formats of data collection and analysis.	
	1.11 Reproductive technologies and gene manipulation techniques.	
	1.12 Ethical approaches and considerations for genetic technology and biotechnology.	
	1.13 Validation and methods for presentation of findings.	

	1.14 Identify and source suitable information for analysis.	
	1.15 Use appropriate primary and secondary research methods to gather information for scientific analysis.	
	1.16 Use appropriate tools to gather information.	
	1.17 Assess information and research findings against the original proposal or brief.	
	1.18 Present research data to inform on reproductive technology and genetics.	
	1.19 Identify the uses for reproductive technologies.	
	1.20 Assess the regulatory and ethical dimensions of the genetic manipulation of animals.	
	1.21 Interpret research briefs and plan a research project.	
PO2 Observe the behaviour, security and breeding practices of animals.	2.1 Legislation and regulation requirements for breeding animals.	Synoptic Assignment
	2.2 Animal classification.	Science Knowledge Test
	2.3 Evolution and natural selection of common wild and captive animals.	
	2.4 The changing role of zoos and national and international organisations involved in conservation.	Synoptic Assignment
	2.5 Techniques and technologies used to assess the conservation status of species and habitats.	
	2.6 Ethics of human-animal interaction in conservation activities.	
	2.7 Planning considerations for population management.	
	2.8 Population management techniques.	
	2.9 Breeding programmes, values and professional bodies.	
	2.10 Equipment for breeding and handling of pregnant or gravid animals.	

	2.11 Management of the breeding female and potential problems that may occur.	
	2.12 Management of the breeding male and potential problems that may occur.	
	2.13 Management of the offspring and potential problems that may occur.	
	2.14 Care plans for the offspring in the first 24–48 hour of life.	
	2.15 Reproductive performance and life stages.	
	2.16 DNA and RNA structure and function.	Science Knowledge Test
	2.17 DNA replication.	
	2.18 Mitosis and Meiosis and their stages.	
	2.19 Mendelian inheritance.	
	2.20 Types of mutations.	
	2.21 Gene interactions.	
	2.22 Epigenetics and gene expression.	
	2.23 Population ecology and genetics.	
	2.24 Create plans for population management.	Synoptic Assignment
	2.25 Observe, record, report and interpret the behaviour of captive or wild animals in response to a range of stimuli.	
PO3 Plan for and manage the good health and welfare of animals.	3.1 Animal welfare legislation and regulation.	Synoptic Assignment
	3.2 Animal husbandry and the five welfare needs and five welfare domains.	
	3.3 Animal husbandry plans.	

	3.4 Nutritional requirements and formulating feeding plans.	Science Knowledge Test
	3.5 Assessing visual, physical and behavioural indications of animal health.	Synoptic Assignment
	3.6 Medicine types, storage and administration.	Science Knowledge Test
	3.7 The veterinary practice, roles within it and veterinary terminology.	
	3.8 Pathogens and animal diseases and disorders at different life stages.	Synoptic Assignment and Science Knowledge Test*
	3.9 Identify and assess severity of and report potential health issues in animals.	Synoptic Assignment
	3.10 Identify and assess the need for basic treatments and preventative care.	
	3.11 Interpret nutritional information and modify diets for animals.	
PO4 Carry out safe animal handling practices.	4.1 Legislation and regulation surrounding the handling of animals.	Synoptic Assignment
	4.2 Hazards and risks of handling animals and high-risk situations.	
	4.3 Reasons and techniques for handling animals.	
	4.4 Equipment for handling and moving animals.	
	4.5 Considerations for moving animals.	
	4.6 Types and purposes of accommodation and their suitability for species.	
	4.7 Considerations for accommodation cleaning and maintenance.	
	4.8 Work safely when handling and housing animals.	
	4.9 Create plans for and select equipment and handling methods relevant to specific situations and species.	
	4.10 Apply appropriate pressure and dexterity when handling animals.	

	4.11 Select the most appropriate methods of successfully transporting animals.	
	4.12 Designing accommodation for different stakeholder needs.	
PO5 Plan, perform, record and communicate findings of scientific investigations in animal science.	5.1 Legislation and regulation in animal science investigations.	Science Knowledge Test
	5.2 Design and planning of scientific investigations.	Synoptic Assignment
	5.3 Safe working methods in laboratories.	
	5.4 Hazards in microbiology.	
	5.5 Methods of bacterial identification and growth of microorganisms.	
	5.6 Techniques in microbiology.	
	5.7 Uses of microorganisms.	
	5.8 Effective use of microscopes.	
	5.9 Acids, bases and associated theories.	
	5.10 Rates of reaction and catalysts.	Science Knowledge Test
	5.11 How enzymes and their properties can be used in reactions.	
	5.12 Dynamic nature of equilibrium.	
	5.13 Cellular respiration.	
	5.14 Atomic structure and the periodic table.	
	5.15 Chemical bonding, balancing equations and biochemical reactions.	
	5.16 Organic molecules.	

	5.17 Mass, molarity and solutions.	
	5.18 Design and implement scientific investigations.	Synoptic Assignment
	5.19 Analyse results and summarise findings using reporting tools.	
	5.20 Measure, record and present scientific information.	
	5.21 Use microscopes to make observations and identify biological specimens.	
	5.22 Interpret the key features of equilibrium processes.	

* Where a criterion is covered in more than one assessment component, different areas of the content will be targeted in each assessment.

Appendix 1 Sources of general information

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

City & Guilds Centre Manual

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

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

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

Our Quality Assurance Requirements

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

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

Our Quality Assurance Requirements document encompasses the relevant regulatory requirements of the following documents, which apply to centres working with City & Guilds:

- Ofqual's General Conditions of Recognition.

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

- **Walled Garden**: how to register and certificate candidates online
- **Events**: dates and information on the latest Centre events
- **Online assessment**: how to register for e-assessments.

Appendix 2 Species list for knowledge criteria

This is a suggested list of species to be taught for the knowledge criteria across the Animal Care and Management T level. Species can be grouped together for teaching some areas of knowledge such as 'ruminants' or 'flight animals' to aid teaching – where species have specific adaptations, these should be taught separately such as cheetahs' adaptations for sprinting or conservation activities for specific species.

This list is not exhaustive and for centres that house species not listed below, these can still be used in teaching.

Mammalia/Mammals	**Aves/Birds**	**Reptilia/Reptiles**
Artiodactyla/Even-toed ungulates • *Bos taurus* (Cow) • *Camelus bactrianus* (Bactrian Camel) • *Capra hircus* (Goat) • *Capreolus capreolus* (Roe deer) • *Cervus elaphus* (Red deer) • *Giraffa camelopardalis* (Giraffe) • *Lama pacos* (Alpaca) • *Ovis aries* (Sheep) • *Sus domesticus* (Pig) **Perissodactyla/Odd-toed ungulates** • *Ceratotherium simum* (White rhino) • *Diceros bicornis* (Black rhino) • *Equus africanus asinus* (Donkey) • *Equus ferus caballus* (Horse) • *Equus ferus przewalskii* (Przewalski's horse) • *Equus grevyi* (Grevy's Zebra) **Carnivora/Carnivores** • *Acinonyx jubatus* (Cheetah) • *Canis familiaris* (Dog) • *Canis lupus* (Grey wolf) • *Felis catus* (Cat) • *Lutra Lutra* (Otter) • *Meles meles* (Badger) • *Mustela furo* (Ferret)	**Stringiformes/Owls** • *Tyto javanica* (Eastern barn owl) **Struthioniformes/Ratites** • *Rhea americana* (Greater rhea) **Accipitriformes/Hawks, eagles, vultures, kites** • *Milvus milvus* (Red kite) • *Parabuteo inicinctus* (Harris hawk) **Falconiformes/falcons** • *Falco peregrinus* (Peregrine falcon) • *Falco tinnunculus* (Kestrel) **Anseriformes/Waterfowl** • *Anus platyrhynchos* (Mallard duck) **Galliformes/landfowl** • *Gallus domesticus* (Chicken) **Psittaciformes/Parrots, finches, budgies** • *Crithagra sulphurate* (Yellow canary) • *Melopsittacus undulatus* (Budgerigar) • *Nymphicus hollandicus* (Cockatiel) • *Taeniopygia castanotis* (Zebra finch)	**Chelonia/Turtles, tortoises, terrapins** • *Centrochelys sulcata (*Sulcata tortoise) • *Dermochelys coricea* (Leatherback turtle) • *Testudo hermanni* (Hermann's tortoise) • *Trachemys scripta scripta* (Yellow bellied slider) **Squamata/Snakes, Lizards** • *Correlophus ciliates* (Crested gecko) • *Eublepharis macularius* (Leopard gecko) • *Iguana iguana* (Green iguana) • *Pantheraophis guttatus* (Corn snake) • *Pogona vitticeps* (Bearded dragon) • *Python regius* (Royal python) • *Vipera berus* (Adder)

• *Panthera leo leo* (African lion) • *Panthera pardus* (Leopard) • *Panthera tigris sondaica* (Sumatran tiger) • *Vulpes vulpes* (Red fox) **Proboscidea/Elephants** • *Elephas maximus* (Asian elephant) • *Loxodonta africana* (African elephant) **Rodentia/Rodents** • *Cavia porcellus* (Guinea pig) • *Chinchilla chinchilla* (Chinchilla) • *Meriones unguiculatus* (Mongolian gerbil) • *Mesocricetus auratus* (Syrian hamster) • *Mus musculus* (Fancy mouse) • *Octodon degus* (Degu) • *Rattus norvegicus* (Fancy rat) **Lagomorpha/Rabbits, hares** • *Oryctolagus cuniculus* (Rabbit) **Marsupiala/Marsupials** • *Notamacropus rufogriseus* (Red-necked wallaby) **Monotremata/Egg laying** • *Ornithorhunchus anatinus (Platypus)* **Primates** • *Gorilla gorilla* (Western gorilla) • *Pan troglodytes* (Chimpanzee) • *Pongo abelii* (Sumatran orangutan) • *Pongo pygmaeus* (Bornean orangutan) **Cetacea/Whales, dolphins** • *Delphinus delphis* (Common dolphin) • *Megaptera novaeangliae* (Humpback whale)		

• *Orcinus orca* (Orca)		
Amphibia/Amphibians	**Fish**	**Invertebrate**
Anura/Frogs, toads • *Bombina orientalis* (Oriental fire bellied toad) • *Epidalea calamita* (Natterjack toad) • *Ranoidea caerulea* (White's tree frog) **Caudata/Salamanders, newts** • *Triturus cristatus* (Great crested newt)	**Agnatha/Jawless fish** • *Lampetra fluviatilis* (River lamprey) **Chondrichthyes/Cartilaginous fish, sharks, rays** • *Alopias vulpinus* (Thresher shark) • *Cetorhinus maximus* (Basking shark) • *Galeocerdo cuvier* (Tiger shark) • *Ginglymostoma cirratum* (Nurse shark) • *Prionace glauca* (Blue shark) **Osteichthyes/Bony fish** • *Amphiprioninae ocellaris* (Clown fish) • *Carassius auratus* (Goldfish) • *Cichlidae* (Cichlid species) • *Poecilia reticulata* (Guppy) • *Salmo salar* (Atlantic salmon)	**Arthropoda/Spiders, insects, crabs** • *Apis mellifera* (Honey bee) • *Blaptica dubia* (Dubia cockroach) • *Brachypelma emilia* (Mexican redknee tarantula) • *Carausius morosus* (Indian stick insect) • *Dorcus curvidens* (Stag beetle) • *Gromphadorhina portentosa* (Madagascan hissing cockroach) **Mollusca/Snails, octopus** • *Lissachatina fulica* (Giant African Land Snail)

Useful contacts

UK learners General qualification information	**E: learnersupport@cityandguilds.com**
International learners General qualification information	**E: intcg@cityandguilds.com**
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	**E: centresupport@cityandguilds.com**
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	**E: singlesubjects@cityandguilds.com**
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	**E: intops@cityandguilds.com**
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	**E: walledgarden@cityandguilds.com**
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	**T: +44 (0)121 503 8993** **E: business@cityandguilds.com**

If you have a complaint, or any suggestions for improvement about any of the services that City & Guilds provide, email: **feedbackandcomplaints@cityandguilds.com**

About City & Guilds

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

City & Guilds Group

The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Licence to Practice (land-based qualifications) and Learning Assistant (an online e-portfolio).

City & Guilds
5-6 Giltspur Street
London EC1A 9DE
www.cityandguilds.com