T-LEVELS | Institute for Apprenticeships & Technical Education

Qualification specification

T Level Technical Qualification in Healthcare Science

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NCFE CACHE

T Level Technical Qualification in Healthcare Science
Qualification Specification

Healthcare Science

603/7083/X

Contents

Section 1: Introduction

A T Level[1] is a composite technical study programme, aimed at preparing young people for work, higher level apprenticeships or higher education (HE). It comprises 4 key components:

- an approved technical qualification, which includes the opportunity to specialise in at least one occupational role
- a substantial industry placement with an external employer (further information regarding the required number of hours can be found on page 8)
- employability, enrichment and pastoral (EEP) elements
- in some cases, it may also include mandatory additional requirements (MAR), such as important licence to practise qualifications

The T Level Technical Qualification in Healthcare Science forms part of the new T Level in Health and Science. The outline content has been produced by T Level panels based on the same standards as those used for apprenticeships. The outline content formed the basis of this qualification and has been further developed by NCFE CACHE.

The Technical Qualification (TQ) in Healthcare Science has 2 components:

- core component:
  - route core elements
  - pathway core elements
  - employer-set project (ESP)
- occupational specialism components:
  - Optical Care Services
  - Assisting with Healthcare Science

The core, comprising route and pathway core components, provides a variety of knowledge and skills relevant to the health and science route as a whole, as well as the occupational specialism components within the Healthcare Science pathway. Some of the core topics and ideas are broken down and contextualised in more detail within the occupational specialisms, allowing students to apply the knowledge and skills in their own specific context.

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

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

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

About this TQ specification

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

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

Section 2: Summaries

Technical qualification summary

Qualification title

T Level Technical Qualification in Healthcare Science

Qualification number (QN)

603/7083/X

Aim reference

6037083X

Qualification level

Level 3

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

	GLH for delivery	GLH for assessment	Total GLH	TQT
Core component	490 hours	22 hours 45 minutes	512 hours 45 minutes	560 hours
Optical Care Services	550 hours	4 hours 40 minutes	554 hours 40 minutes	610 hours
Assisting with Healthcare Science	590 hours	6 hours 25 minutes	596 hours 25 minutes	660 hours

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

GLH will vary across the TQ, due to the different requirements of each occupational specialism.

Minimum age

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

Qualification purpose

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

Objectives

The objectives of this qualification are to equip students with:

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

Industry placement experience

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

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

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

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

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

Temporary flexibilities for industry placements

Recognising the ongoing impact of Covid-19, the Department for Education has introduced temporary flexibilities for 2021 T Level students undertaking Health and Science. These flexibilities will ensure that industry placements are deliverable and aligned to current working practices. They will be withdrawn in July 2023.

For full details, please refer to: Temporary flexibilities for Wave 1 and Wave 2 industry placements.

Providers must still plan to deliver placements against the core principles set out in the T Level industry placement delivery guidance. These flexibilities should be used by exception and as a last resort.

Rules of combination

Students are required to complete:

- the core component
- one occupational specialism component

Students must not complete more than one occupational specialism component.

Approved providers can select which occupational specialism component to deliver to their students.

Grading

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

Assessment method

Core component:

- 2 written examinations
- ESP

In order to achieve a grade for Core Component, students must have results for both sub-components (the core (written) examination and the employer-set project).

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

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

Occupational specialism component:

- synoptic assignments

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

Progression including job roles (where applicable)

Students who achieve this qualification could progress to the following, depending on their chosen occupational specialism:

- employment:
    - optical assistant
    - healthcare science assistant
- higher education
- apprenticeship (progression onto lower-level apprenticeships may also be possible in some circumstances, if the content is sufficiently different)

UCAS

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

Regulation information

This is a regulated qualification.

Funding

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

English, mathematics and digital content

English, mathematics and digital content is embedded and contextualised within the core skills and occupational specialism qualification content. This content must be taught to all students and will be subject to assessment.

Entry guidance

This qualification is designed for post 16 students.

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

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

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

Transition programme

For those students who are not yet ready to start a T Level programme at 16, they will be able to study a new T Level transition programme. This is a new 16 to 19 study programme designed to give young people effective, tailored preparation specifically to help them progress onto and succeed in a T Level.

The T Level transition programme will be introduced through phased implementation, working initially with a small number of volunteer T Level schools, colleges and training companies, to explore different approaches to delivery and develop good practice in effectively preparing students for a T Level. More information on the T Level transition programme can be found on the government's website.

Registering students on T Levels

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

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

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

Transferring between T Levels and occupational specialisms (OSs)

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

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

Achieving this qualification

To achieve this qualification, the student must successfully demonstrate their achievement of the core component and one occupational specialism component (the Supporting Healthcare occupational specialism includes additional core content, plus one from options A to E). In order to achieve a grade for the core component, the student must attempt both the external examination and ESP sub-components. The results from these will be aggregated to form the overall core component grade (A* to E and U). If students do not attempt one of the sub-components, an overall component grade will be withheld pending the attempt of both. If students fail to reach the minimum standard across sub-components after attempting both, they will receive a U grade for the component. The student is required to successfully achieve a distinction/merit/pass grade in one of the occupational specialism components. If the student fails to reach the specified level of attainment, they will receive a U grade.

Retakes

Core component retakes

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

- 2 written examinations
- ESP

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

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

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

Occupational specialism component retakes

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

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

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

Technical qualification components

Component	Level	Content
Core component (section A: the health and science sector)	3	A1 Working within the health and science sector A2 The healthcare science sector A3 Health, safety and environmental regulations in the health and science sector A4 Health and safety regulations in healthcare science A5 Providing person-centred care when working in healthcare science A6 Infection prevention and control A7 Managing information and data within the health and science sector A8 Managing information and data A9 Good scientific and clinical practice A10 Good scientific practice

Component	Level	Content
Core component (section B: science concepts)	3	B1 Core science concepts B2 Further science concepts

Component	Level	Content
Employer-set project – core skills	3	CS1 Research skills CS2 Communication skills CS3 Team working skills CS4 Problem solving skills CS5 Reporting and presentation skills CS6 Reflective evaluation

Students are required to complete one occupational specialism option.

Component	Level	Content
Optical Care Services	3	1 Provide optical care and advice including prescription interpretation, screening and dispensing to contribute to patient health and wellbeing 2 Provide spectacle collection, adjustments and repair services 3 Undertake retail activities to provide walk-in customers with a range of products and optical services
Assisting with Healthcare Science	3	1 Contribute to patient care by supporting physiological, physical and clinical engineering services to produce reliable data and images for use by healthcare professionals in diagnosis and treatment 2 Contribute to patient care by supporting the collection of a range of specimens for analysis to aid diagnosis and treatment 3 Contribute to patient care by processing and analysing service user specimens in a range of life science areas and laboratory environments to produce reliable data sets for use by healthcare professionals in diagnosis and treatment

Employer involvement

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

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

Progression to higher level studies

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

- checking and testing information
- supporting points with evidence
- self-directed study
- self-motivation
- thinking for yourself
- analysing and synthesising information/materials
- critical thinking and problem solving
- working collaboratively

- reflecting upon learning and identifying improvements
- presenting information in written and verbal formats

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

How the qualification is assessed

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

The core component is 100% externally assessed. External assessments are set and marked by NCFE. The external examinations and ESP will assess students' core knowledge, core understanding and core skills relevant to the occupations within the healthcare science TQ.

The occupational specialism components are also externally assessed through synoptic assignments, except for the observation element, which is internally marked by providers and externally moderated by NCFE. These synoptic assignments will assess the knowledge, understanding, skills and behaviours required to achieve threshold competence in the student's chosen occupational specialism.

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

The assessment consists of:

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

Quality of written communication

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

Application of mathematics, significant figures and decimal places

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

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

Rationale for synoptic assessment

Synoptic assessments test students' understanding of the connections between the topics covered across the performance outcomes within the chosen occupational specialism.

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

Scheme of assessment for each component

Each component in the core is worth the following weighting:

	% weighting of the core component
Paper A	36%
Paper B	34%
Sub-total	70%
ESP	30%
Total	**100%**

External examinations (core)

Overview of assessment

Paper A

Written examination

Duration: 2 hours 30 minutes

110 marks (plus 12 marks for Quality of Written Communication) = 122 marks total

This paper is composed of 4 sections, which may consist of multiple-choice questions, short-answer and extended writing:

- section A: 34 marks
- section B: 34 marks
- section C: 21 marks
- section D: 21 marks

Paper B

Written examination

Duration: 2 hours 30 minutes

100 marks plus 12 marks for Quality of Written Communication = 112 marks total (10-16 marks for maths already included in the 100 marks)

This paper is composed of 4 sections, which may consist of multiple-choice questions, short-answer and extended writing:

- section A: 45 marks
- section B: 26 marks
- section C: 17 marks
- section D: 12 marks

Content subject to assessment

Paper A – route and pathway core elements A1-A10

Section A – the roles and responsibilities within healthcare science

- A1 – Working within the health and science sector (R)
- A2 – The healthcare science sector (P)
- A5 – Providing person-centred care when working in healthcare science (P)

Section B – personal and patient safety

- A3 – Health, safety and environmental regulations in the health and science sector (R)
- A4 – Health and safety regulations in healthcare science (P)
- A6 – Infection prevention and control in healthcare science settings (P)

Section C – data handling and confidentiality

- A7 – Managing information and data within the health and science sector (R)
- A8 – Managing information and data (P)

Section D – regulatory and professional frameworks

- A9 – Good scientific and clinical practice (R)
- A10 – Good scientific practice (P)

Paper B – route and pathway core elements B1 and B2

Section A – Biology

- structure and function of cells and tissues (R)
- large molecules (R)
- exchange and transport mechanisms (R)
- genetic information and genetics (R)
- microbiology (R)
- immunology (R)
- human anatomy and physiology (P)
- diseases and disorders
- genomics (P)
- units (R)

Section B – Physics

- electricity (R)
- magnetism and electromagnetism (R)
- waves (R)

- particles and radiation (R)
- medical physics (P)
- units (R)

Section C – Chemistry

- material and chemical properties (R)
- acids/bases and chemical change (R)
- rates of reaction and energy changes (R)
- chemical analysis of substances (R)
- units (R)

Section D – Scientific concepts

- taken from any of the above content areas: biology, chemistry and physics

R = route

P = pathway

Assessment objectives and weightings

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

	Objective	
AO1	Demonstrate knowledge and understanding of contexts, concepts, theories and principles in healthcare science	26–32%
AO2	Apply knowledge and understanding of contexts, concepts, theories and principles in healthcare science to different situations and contexts	39–48%
AO3	Analyse and evaluate information and issues related to contexts, concepts, theories and principles in healthcare science to make informed judgements, draw conclusions and address individual needs	34–39%

Total marks

	Paper A	Paper B	Total
AO1	25–29 marks (13–16%)	26–30 marks (13–16%)	51–59 marks (26–32%)
AO2	40–48 marks (20–26%)	38–42 marks (19–22%)	78–90 marks (39–48%)
AO3	36–39 marks (18–21%)	30–34 marks (15–18%)	66–73 marks (34–39%)
QWC	12 marks	12 marks	24 marks
Maths		10-16 marks	10-16 marks
Total	122 marks	112 marks	234 marks

The mark and percentage weighting ranges in the table above show how the core examination will target the AOs in this qualification. Each version of the core examination will adhere to these mark and percentage weighting ranges. The marks and percentage weightings are given as ranges to account for slight variation over time in the writing of new versions of the core examination.

Assessment availability

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

Assessment conditions

The core external examinations must be invigilated.

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

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

ESP (core component)

Overview of assessment

Externally-set (in conjunction with employers) project.

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

To achieve the AOs and meet the brief, students must demonstrate the following core skills:

- core skill 1 (CS1): Research skills – be able to research from independently identified sources of information, including being able to conduct literature searches to contribute to research and innovation within a specific area of practice
- core skill 2 (CS2): Communication skills – communicate effectively with patients, customers, carers and other health and social care professionals using a range of techniques to overcome communication barriers
- core skill 3 (CS3): Team working skills – work collaboratively with a range of healthcare professionals within and outside a specific team, as well as with other individuals such as carers
- core skill 4 (CS4): Problem solving skills – be able to identify problems, propose innovative solutions and implement these solutions and, where appropriate, make use of new technologies to solve problems
- core skill 5 (CS5): Reporting and presentation skills – be able to interpret and analyse information and data to present conclusions in a range of formats to a variety of stakeholders
- core skill 6 (CS6): Reflective evaluation – be able to reflect on own practice and make improvements to own practice, for example, having completed a task reviewing and suggesting improvements and consideration of lessons learnt for own professional development

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

Duration: 17 hours 45 minutes

Assessment objectives

Assessment objectives (AOs)		Weighting
AO1	Plan their approach to meeting the project brief	6 marks 6.25%
AO2	Apply core knowledge and skills to meet quality management objectives	48 marks 50.00%
AO3	Select relevant techniques and resources to meet the brief	11 marks 11.46%
AO4	Use English, mathematics and digital skills as appropriate	15 marks 15.63%
AO5	Realise a project outcome and review how well the outcome meets the brief	16 marks 16.66%

Task:	**Task 1**	**Task 2**	**Task 3**	**Task 4**	**Task 5**	**Total:**
AO:						
AO1	0	6	0	0	0	6
AO2	15	14	2	11	6	48
AO3	5	0	2	0	4	11
AO4	4	9	0	2	0	15
AO5	0	0	5	5	6	16
Total	24	29	9	18	16	96

Subject content to be assessed

Core knowledge relevant to the brief will be covered in the employer-set project; this will change for each assessment window.

Assessment availability

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

Assessment conditions

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

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

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

UMS

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

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

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

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

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

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

Scheme of assessment for each component

Occupational specialism – Optical Care Services

Overview of assessment

Synoptic assignments comprise task-based assignments including observations.

Duration: 4 hours 40 minutes

Consisting of:

Assignment 1: 20 minutes

Assignment 2: 30 minutes

Assignment 3: 1 hour 50 minutes

Assignment 4: 2 hours

Content subject to assessment

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

Performance outcome 1: Provide optical care and advice including prescription interpretation, screening and dispensing to contribute to patient health and wellbeing

Performance outcome 2: Provide spectacle collection, adjustments and repair services

Performance outcome 3: Undertake retail activities to provide walk-in customers with a range of products and optical services

Assessment weightings

Assignment	% weighting of the occupational specialism	Max raw mark	Scaling factor*	Max scaled mark
Assignment 1	20%	50 marks	1.600	80 marks
Assignment 2	25%	58 marks	1.724	100 marks
Assignment 3	35%	123 marks	1.138	140 marks
Assignment 4	20%	80 marks	1.000	80 marks
Total	100%	311 marks		400

Total marks

311

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

Assessment availability

There will be one assessment opportunity per year from summer 2022. Please refer to the assessment timetable on QualHub for further information.

Assessment conditions

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

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

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

Occupational specialism – Assisting with Healthcare Science

Overview of assessment

Synoptic assignments comprise task-based assignments including observations.

Duration: 6 hours 25 minutes

Consisting of:

Assignment 1: 1 hour

Assignment 2: 55 minutes

Assignment 3: 2 hours 30 minutes

Assignment 4: 2 hours

Content subject to assessment

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

Performance outcome 1: Contribute to patient care by supporting physiological, physical and clinical engineering services to produce reliable data and images for use by healthcare professionals in diagnosis and treatment

Performance outcome 2: Contribute to patient care by supporting the collection of a range of specimens for analysis to aid diagnosis and treatment

Performance outcome 3: Contribute to patient care by processing and analysing service user specimens in a range of life science areas and laboratory environments to produce reliable data sets for use by healthcare professionals in diagnosis and treatment

Assessment weightings

Assignment	% weighting of the occupational specialism	Max raw mark	Scaling factor*	Max scaled mark
Assignment 1	27%	77 marks	1.753	135
Assignment 2	20%	100 marks	1.000	100
Assignment 3	26%	94 marks	1.383	130
Assignment 4	27%	80 marks	1.688	135
Total	100%	351 marks		500

Total marks

351

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

Assessment availability

There will be one assessment opportunity per year from summer 2022. Please refer to the assessment timetable on the NCFE website for further information.

Assessment conditions

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

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

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

Core written examinations

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

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

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

Sample assessment materials

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

Results

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

Enquiries about results

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

Grading

Core component

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

Core component grade descriptors

Grade	Demonstration of attainment
A	**A grade A student can:**
	Consistently demonstrate appropriate and accurate use of terminology and conventions.
	Consistently demonstrate a comprehensive subject knowledge and thorough grasp of ideas, processes and procedures applied to familiar and unfamiliar contexts.
	Consistently demonstrate mastery of key skills.
	Accurately use a full range of mathematical skills relevant to the sector.
	Critically analyse and evaluate information, quantitative and qualitative data, supported with relevant examples and analysis.
	Construct and justify a reasoned argument by making substantiated judgement to reach valid conclusions.
	Effectively organise, select, apply and present relevant information and data clearly supported with appropriate examples and analysis relevant to the sector.
	Reflect and communicate effectively on strengths and limitations.
	Demonstrate insight in linking together principles and concepts appropriate to the sector.
E	**A grade E student can:**
	Demonstrate a limited but satisfactory use of terminology, but this may be inconsistent and inaccurate.
	Demonstrate a limited range of skills, however these may not always be relevant to the task.
	Demonstrate a limited understanding of ideas, processes, and procedures, applied to some familiar and unfamiliar contexts.
	Use a limited range of simple mathematical skills relevant to the sector.

Grade	Demonstration of attainment
	Perform limited analysis of information, quantitative and qualitative data, supported with some examples and basic analysis.
	Organise and present information with some limited effectiveness, supported with examples and some analysis that may be rudimentary.
	Reflect and comment on strengths and limitations.
	Make simplistic links between some principles and concepts to further understanding.

Occupational specialism components

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

Optical Care Services occupational specialism grade descriptors*

Grade	Demonstration of attainment
Pass	The student demonstrates good knowledge and understanding of the topics and the optical/healthcare context in which it lies.
	The student demonstrates good levels of professional practice, including record keeping, whilst carrying out tasks/activities showing respect to safety, care and confidentiality for patients, colleagues and oneself.
	The student has an appreciation of the action to be taken when errors occur.
	The student demonstrates a good understanding of their own development with some learning through reflective practice.
	The student demonstrates good skills and knowledge of the relevant concepts and techniques reflected in an optical setting and generally applies this across different contexts.
	The student demonstrates good practical skills showing respect for safety, care and confidentiality for patients, colleagues and oneself.
	The student can interact with a range of staff and patients and has good knowledge and understanding of prescriptions, spectacles and lenses across a range of contexts.
Distinction	The student demonstrates excellent knowledge and understanding of the topics and appreciation of the optical/healthcare context in which it lies.
	The student demonstrates excellent levels of professional practice, including record keeping, whilst

Grade	Demonstration of attainment
	carrying out tasks/activities applying them in the optical context.
	The student shows respect for safety, care and confidentiality for patients, colleagues and oneself.
	The student fully acknowledges when errors occur and the reporting process.
	The student demonstrates a good insight to their own development, demonstrating significant learning through reflective practice.
	The student draws on reflective practice and relates their development and learning to work in practice.
	The student demonstrates excellent practical skills showing respect for safety, care and confidentiality for patients, colleagues and oneself.
	The student can interact with a broad range of staff and patients and displays an excellent range of knowledge and understanding of prescriptions, spectacles and lenses across a range of contexts.

Assisting with Healthcare Science occupational specialism grade descriptors*

Grade	Demonstration of attainment
Pass	The student demonstrates good knowledge and understanding of the topics and the healthcare context in which it lies.
	The student demonstrates professional practice whilst carrying out tasks/activities showing respect to safety, care and confidentiality for patients, colleagues and oneself.
	The student has an appreciation of action to be taken when errors occur.
	The student demonstrates a good understanding of their own development with some learning through reflective practice.
	The student demonstrates good skills and knowledge of the relevant concepts and techniques reflected in a healthcare science setting and generally applies this across different contexts.
	The student demonstrates good skills regarding showing respect for safety, care and confidentiality for patients, colleagues, and oneself.
Distinction	The student demonstrates excellent knowledge and understanding of the topics and appreciation of the healthcare context in which it lies.
	The student demonstrates excellent understanding of professional practice whilst carrying out tasks/activities applying them in the healthcare context.
	The student shows respect for safety, care and confidentiality for patients, colleagues and oneself.

	The student fully acknowledges when errors occur and the reporting process.
	The student demonstrates a good insight to their own development, demonstrating significant learning through reflective practice.
	The student draws on reflective practice and relates their development and learning to work in practice.

* ‘Threshold competence’ refers to a level of competence that:

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

U grades

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

Awarding the final grade for each component of the TQ

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

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

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

Awarding the final grade for each component of the T Level programme

To be awarded an overall T Level grade, a student must successfully pass both components of their TQ, complete an industry placement, and meet any other requirements set by the Institute’s T Level panel.

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

- the comparative size of the core component and the occupational specialism
- the grades achieved for the core component (A* to E) and the occupational specialism (Pass/Merit/Distinction)

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

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

Core component 46%/occupational specialism 54%:

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

Overall T Level grade

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

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

Merit

Section 3: General competency framework

General competency framework

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

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

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

English, mathematics and digital competencies relevant to the healthcare science TQ

General competencies	Core skills	Optical Care Services	Assisting with Healthcare Science
English			
GEC1	CS2, CS5	S1.81, S1.82, S1.84, S1.85, S1.86, S1.90, S1.95, S1.96, S1.97, S1.105, S1.111, S2.15	S1.52, S1.54, S1.55, S1.64, S1.65, S1.73, S1.77, S2.52, S2.56, S2.59, S2.62, S2.63, S2.65, S2.66, S2.71, S2.79, S3.40, S3.41, S3.42, S3.44, S3.58, S3.59
GEC2	CS1, CS2, CS3, CS4	S1.107, S1.110, S2.15	S1.54, S1.55, S1.56, S1.64, S1.66, S1.73, S2.52, S2.53, S2.56, S2.59, S2.65, S2.66, S2.76, S2.77, S3.40, S3.41, S3.43, S3.58, S3.59
GEC3	CS1, CS2		S1.54, S2.51, S2.57, S2.65, S2.66, S3.40, S3.42, S3.58, S3.59
GEC4	CS1	S3.32	S1.54, S1.55, S1.61, S1.62, S1.64, S1.66, S1.67, S1.79, S2.51, S2.52, S2.56, S2.57, S2.58, S2.59, S2.71, S2.76, S2.77, S2.78, S3.40, S3.41, S3.49
GEC5	CS1	S1.90, S1.112	S1.53, S1.54, S1.56, S1.65, S1.67, S1.70, S1.71, S1.72, S1.75, S2.50, S2.51, S2.53, S2.54, S2.58, S2.67, S2.68, S2.72, S2.73, S2.75, S2.78, S2.79, S3.39, S3.40, S3.43, S3.48, S3.49, S3.50, S3.57, S3.60

GEC6	CS2, CS3, CS5, CS6	S1.80, S2.20, S2.23, S3.32, S3.33	S1.54, S1.56, S1.57, S1.63, S1.64, S1.65, S1.66, S1.72, S1.80, S2.51, S2.52, S2.53, S2.54, S2.56, S2.58, S2.59, S2.60, S2.61, S2.67, S2.68, S2.69, S2.70, S2.72, S2.74, S2.75, S2.76, S2.77, S2.79, S2.81, S3.40, S3.41, S3.42, S3.45, S3.46, S3.48, S3.54, S3.55, S3.56
General competencies	**Core skills**	**Optical Care Services**	**Assisting with Healthcare Science**
Mathematics			
GMC1		S1.93, S1.100, S2.24	S1.56, S1.57, S1.58, S1.59, S1.60, S1.61, S1.62, S1.77, S2.49, S2.53, S2.54, S2.62, S2.70, S2.73, S2.74, S2.75, S3.42, S3.43, S3.48, S3.52, S3.54, S3.55, S3.56, S3.57, S3.58
GMC2			S1.56, S1.57, S1.60, S1.62, S2.53, S2.54, S2.73, S3.42, S3.43, S3.52, S3.53, S3.54, S3.55, S3.56
GMC3			S1.56
GMC4			S3.42
GMC5	CS5	S1.87	S1.56, S1.58, S1.59, S1.60, S1.68, S1.70, S1.77, S3.40, S3.42, S3.43, S3.58
GMC6			S1.56, S1.59, S1.68, S1.69, S2.81, S3.54, S3.55, S3.56, S3.59
GMC7			

GMC8	CS2		S1.57, S2.58, S2.59, S2.78, S3.42, S3.43, S3.59
GMC9			
GMC10			S2.74
General competencies	**Core skills**	**Optical Care Services**	**Assisting with Healthcare Science**
Digital			
GDC1		S1.108, S1.109	S1.52, S1.56, S1.57, S1.58, S1.59, S1.60, S2.75, S3.38, S3.40, S3.42, S3.47, S3.51, S3.52, S3.53, S3.55, S3.56
GDC2	CS2		S1.68, S2.80, S3.57
GDC3		S1.82	S3.58, S3.60
GDC4	CS5	S1.88, S2.17	S1.52, S1.77, S3.38, S3.43, S3.51
GDC5	CS5	S1.109	S1.65, S1.68, S1.71, S1.74, S1.76, S1.77, S1.78, S1.80, S2.55, S2.57, S2.58, S2.64, S2.65, S2.66, S2.78, S2.80, S3.47, S3.51, S3.57, S3.60
GDC6		S1.111, S3.26	S1.57, S1.76, S3.47

Section 4: TQ content

Introduction

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

Qualification structure

The T Level Technical Qualification in Healthcare Science has 2 components:

- core component, comprising core knowledge and core skills
- occupational specialism components:
    - Optical Care Services
    - Assisting with Healthcare Science

This core component content indicates the relevant knowledge and understanding of concepts, theories and principles relevant to all occupations within healthcare science. The knowledge and skills are all externally assessed through 2 written examinations and an ESP.

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

Delivery of content

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

What you need to teach

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

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

Core component (section A: the health and science sector)

Glossary

Patient

A person receiving care, support or treatment.

Service user

A person receiving or using healthcare services.

Customer

An individual who purchases goods or services within the health and science sector.

A1: Working within the health and science sector

What you need to teach
The student must understand: **A1.1 The purpose of organisational policies and procedures in the health and science sector, including:** • equality, diversity and inclusion policies: o complying with legislation o ensuring equality o eliminating discrimination • safeguarding policies: o ensuring the protection from harm of individuals, including those working within the organisation and visitors • • employment contracts: o setting out employment conditions, rights, responsibilities and duties • performance reviews: o evaluating work performance against standards and expectations o facilitating feedback to improve o providing opportunities to raise concerns or issues o contributing to continuing professional development (CPD) • disciplinary policy: o setting and maintaining expected standards of work and conduct o ensuring consistent and fair treatment

What you need to teach

- establishing a sequence for disciplinary action
- grievance policy:
  - providing opportunities for employees to confidentially raise and address grievances
  - establishing a sequence for raising grievances

A1.2 The importance of adhering to quality standards, quality management and audit processes within the health and science sector:

- ensuring consistency
- maintaining health and safety
- monitoring processes and procedures
- facilitating continuous improvement
- facilitating objective, independent review

A1.3 The key principles of ethical practice in the health and science sector:

- autonomy and informed consent
- truthfulness and confidentiality (for example, ensuring validity of outcomes)
- beneficence
- nonmaleficence
- justice (for example, fairness, equality and respect for all)

A1.4 The purpose of following professional codes of conduct:

- clarifies missions, values, principles and standards that everyone must adhere to by:
  - outlining expected professional behaviours and attitudes
  - outlining rules and responsibilities within individual organisations
  - promoting confidence in the organisation

A1.5 The difference between technical, higher technical and professional occupations in health, healthcare science and science, as defined by the Institute for Apprenticeships and Technical Education occupational maps:

- technical: skilled occupations that a college leaver or an apprentice would be entering, typically requiring qualifications at levels 2/3
- higher technical: require more knowledge and skills acquired through experience in the workplace or further technical education, and typically require qualifications at levels 4/5
- professional: occupations where there is a clear career progression from higher technical occupations, as well as occupations where a degree apprenticeship exists

A1.6 Opportunities to support progression within the health and science sector:

- undertaking further/higher education programmes
- undertaking apprenticeship/degree apprenticeship
- undertaking continuing professional development (CPD)
- joining professional bodies

What you need to teach
• undertaking an internship • undertaking a scholarship

A2: The healthcare science sector

What you need to teach
The student must understand: **A2.1 The difference between public, private and charitable healthcare organisations:** • public sector: o public-funded through National Insurance o free at point of delivery • private sector: o premiums o less restricted by budget than public and voluntary sector o more commercial • voluntary/charity sector: o funded through donations o undertake fundraising activities o receive grant funding **A2.2 The purpose of different organisations and services within the healthcare science sector in the UK:** • healthcare science: o collect specimens for analysis o produce data and images for diagnosis and treatment o analyse specimens for diagnosis and treatment o provide health and wellbeing advice • pharmacy services: o supply prescription products o supply non-prescription products o provide health and wellbeing advice o perform retail duties • optical care services: o dispense prescription eyewear o test vision and refractive error

What you need to teach

- detect eye abnormalities
- supply non-prescription eyewear
- perform retail duties

- dental services:
  - provide general dental treatment
  - produce technical dental equipment
  - respond to dental emergencies
  - prescribe products
  - produce a range of dental products made at dental labs
- prosthetic and orthotic services:
  - design and manufacture custom-made devices
  - fit custom-made devices
  - repair and maintain devices
  - prosthetic and orthotic use and wellbeing advice

A2.3 The difference between primary, secondary and tertiary care:

- primary care (for example, general practice surgeries, pharmacies, opticians, dental surgeries and mobile facilities):
  - often the first point of contact
  - coordinates care
  - provides general care
  - makes referrals
- secondary care (for example, pathology laboratory):
  - planned
  - provides specialised care
  - provides emergency care
- tertiary care (for example, cancer services, orthopaedics, cardiac sciences, quaternary care):
  - provides highly specialised services
  - primarily referral only

A2.4 The diversity of working environments within the healthcare science sector:

- healthcare science:
  - hospital clinics
  - hospital wards
  - laboratories (for example, pathology laboratory)
  - patient homes
  - medical device manufacturing

What you need to teach

- pharmacy services:
  - hospital pharmacy
  - GP practices
  - prison pharmacy
  - community pharmacy
  - laboratories
  - pharmaceutical industry
- optical care services:
  - high street optometry practice
  - hospital clinics (for example, emergency eye care)
  - dispensing-only practices
- dental services:
  - laboratories
  - dentists/orthodontists
  - hospitals (for example, emergency dental care)
- prosthetic and orthotic services:
  - manufacturers
  - hospital clinics
  - laboratories

A2.5 The purpose of job descriptions, person specifications and the need for entry requirements for jobs within the healthcare science sector:

- job description:
  - scope of role
  - purpose of role
  - responsibilities and reporting lines
  - accountabilities
- person specification:
  - experience required:
    - skills required
    - essential skills
    - desirable skills
  - attributes required
  - qualifications required:
    - essential qualifications
    - desirable qualifications
  - sufficient Disclosure and Barring Service (DBS) check/results

What you need to teach

- mandatory training and continuing professional development required, including reflective practice

A2.6 The range and diversity of job roles within the healthcare science sector:

- healthcare science:
  - healthcare science assistant
  - healthcare science associate
  - clinical scientist
  - healthcare science practitioner
  - biomedical scientist
- pharmacy services:
  - pharmacy services assistant
  - pharmacy technician
  - pharmacist (dispensing and pharmaceutical industry)
  - prescribing pharmacists
- optical care services:
  - optical assistant
  - ophthalmic nurse
  - dispensing optician
  - optometrist
- dental services:
  - dental nurse
  - dental technician
  - dental laboratory assistant
  - dentist
- prosthetic and orthotic services:
  - prosthetic and orthotic technician
  - prosthetists
  - orthotists

A2.7 The links between career pathways and progression routes within the healthcare science sector, as outlined by the Institute for Apprenticeships and Technical Education occupational maps:

- healthcare science practitioner:
  - clinical dental technician (L5)
  - dental technician (L5)
  - healthcare science associate (L4)
  - hygiene specialist (L4)
- healthcare science professional
- pharmacy technician

What you need to teach

- pharmacist

A2.8 The purpose of roles having a clear scope of practice:

- clearly defines procedures and activities staff members are qualified and competent to perform

A2.9 The links between registration and scope of practice in relation to activities which can only be undertaken by a registered healthcare professional:

- dispensing optician:
  - General Optical Council (GOC) registration:
    - illegal to dispense to certain groups (for example, children under 16, registered sight impaired) without registration
- pharmacist:
  - General Pharmaceutical Council (GPhC) registration:
    - illegal to refer to self as pharmacist or pharmacy technician without this
- dental technician:
  - General Dental Council (GDC) registration:
    - illegal to practise as a dentist without this
- clinical scientist and biomedical scientist:
  - Health and Care Professions Council (HCPC) registration:
    - required for professional practice
- prosthetic and orthotic technician:
  - HCPC registration:
    - standards of proficiency required for registration must be met

A2.10 The difference between voluntary and statutory registration:

- voluntary:
  - not legally required, promotes fitness for practise and commitment to continuous professional development (CPD)
  - Professional Standards Authority (PSA) accreditation assists voluntary bodies by showing that they maintain high standards throughout practice
- statutory:
  - legally required to practise
  - provides protected title (for example, biomedical scientist)
  - PSA offers the same standards for the voluntary and statutory registration, but applies mandatory measures to the statutory register

A2.11 The role of accreditation and certification in healthcare science sector jobs:

- defining requirement for CPD
- standardising practice and quality
- recognising competency
- validating competency

What you need to teach

- defining ethical conduct

A2.12 The purpose of appraisals and performance reviews within the healthcare science sector:

- review past performance
- identify areas for improvements
- set SMART (specific, measurable, attainable, relevant, time-bound) goals
- monitor progress towards objectives/key performance indicators (KPIs)
- identify opportunities and requirements for personal/professional development
- facilitate salary and grade reviews

A2.13 The impact of external factors on activities of healthcare science sector organisations:

- factors:
  - epidemics and pandemics
  - extreme weather
  - infrastructure (for example, building and maintenance)
  - geographical and political events
- impacts:
  - service overload
  - re-prioritisation of services
  - insufficient staff resources (for example, staff illness)
  - inaccessible services/supplies
  - damage to facilities
  - additional resource requirements:
    - equipment
    - materials
    - staffing
  - effect on supply chain:
    - costs
    - delivery capacity
  - contingency plan implementation requirements:
    - disaster recovery plan
    - changes to service delivery arrangements impacting turnaround time and patient services

A2.14 The benefits of new technology/automation/artificial intelligence within the healthcare science sector:

- personal mobile technology (constant and personal monitoring):
  - improving diagnostic process:
    - data collection
  - real-time health monitoring

What you need to teach

- point of care testing (POCT) diagnostic equipment:
  - improving diagnostic process
  - automated testing:
    - reduced manual inputs
- digital consultation:
  - improved diagnostic process
  - greater access to services (for example, remote access)
- computer-aided design (CAD):
  - increased efficiency of design
  - increased precision of design (for example, 3D scans and 3D prints of moulds instead of plaster casts)
  - reduced manual inputs
  - increased collaboration opportunities (for example, remote collaboration)
- computer-aided manufacturing (CAM):
  - increased efficiency of manufacturing process
  - increased repeatability
  - increased outputs (for example, units per hour)
  - reduced manual inputs
- electronic health records:
  - increased efficiency
  - increased sharing capacity (for example, records shared between trusts to improve communication)
- miniature scanning equipment:
  - greater access to services
  - individuals have the autonomy to track own health
- automated dispensing cabinet:
  - increased efficiency
  - automated stock checking
  - reduced manual inputs
- online clinics:
  - providing remote care
- personal health apps:
  - health promotion
  - individuals have the autonomy to track own health
- augmented reality applications:
  - increased usability (for example, choosing spectacles using a photo and changing spectacle frames on screen instead of physically trying them on)

What you need to teach

• imaging in healthcare science:
  ○ MRI and CT scans and X-rays, retinal imaging (film vs digital images):
  ▪ scans of microscopic slides for pathology consultations

A3: Health, safety and environmental regulations in the health and science sector

What you need to teach

The student must understand:
A3.1 The purpose of the following legislation and regulations in the health and science sector:
• Health and Safety at Work etc. Act 1974:
  ○ purpose: defines employers' responsibilities to protect the health, safety and welfare at work of employees and members of the public and defines employees' duties to protect themselves and each other
• Management of Health and Safety at Work Regulations 1999:
  ○ purpose: aims to reduce the number and severity of accidents in the workplace, through assessment and management of risk
• Control of Substances Hazardous to Health (COSHH) Regulations 1994 and subsequent amendments 2004
  ○ purpose: requirement for employers to control substances hazardous to health by reducing or preventing employees' exposure to these substances
• Personal Protective Equipment at Work (Amendment) Regulations 2022:
  ○ purpose: defines employers' responsibilities to provide appropriate personal protective equipment (PPE) to reduce harm to employees, visitors and clients. This can include safety helmets, masks, goggles and gloves
• Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR):
  ○ purpose: defines employers' duties to report serious workplace accidents, occupational diseases and specified dangerous occurrences ('near misses')
• Environmental Protection Act 1990:
  ○ purpose: makes provision for the improved control of pollution to the air, water and land by regulating the management of waste and the control of emissions
• Special Waste Regulations 1996:
  ○ purpose: measures relating to the regulation and control of the transit, import and export of waste (including recyclable materials), the prevention, reduction and elimination of pollution caused by waste and the requirement for an assessment of the impact on the environment of projects likely to have significant effects on the environment
• Hazardous Waste (England and Wales) Regulations 2005:
  ○ purpose: controls the storage, transport and disposal of hazardous waste (waste stream) to ensure it is appropriately managed and any risks are minimised

What you need to teach

- Waste Electrical and Electronic Equipment (WEEE) Regulations 2013
  - purpose: to reduce the amount of electronic and electrical equipment incinerated or sent to landfill sites. Places onus on all businesses to correctly store and transport electrical waste
- Regulatory Reform (Fire Safety) Order 2005:
  - purpose: to reduce death, damage and injury caused by fire by placing legal responsibilities on employers to carry out a fire risk assessment. All organisations are required to have procedures for evacuation in the event of a fire
- Manual Handling Operations Regulations 1992 (as amended):
  - purpose: requires employers to assess and minimise the risk to employees' health involved in the manual handling, moving and positioning of an object, person or animal and workplace ergonomics
- Health and Safety (Display Screen Equipment) Regulations 1992:
  - purpose: defines employers' responsibilities in carrying out risk assessments of workstations used by employees, including the use of display screen equipment, to minimise identified risks

A3.2 How to assess and minimise potential hazards and risks, including specific levels of risk, by using the Health and Safety Executive's 5 steps to risk assessment:

- step 1: identifying the hazards
- step 2: deciding who might be harmed and how
- step 3: evaluating the risks and deciding on precautions
- step 4: recording findings and implementing them, including completing risk assessment documentation
- step 5: reviewing your assessment and updating if necessary

A3.3 How health and safety at work is promoted:

- encouraging individuals to take reasonable care of their own and others' safety
- modelling good practice (for example, washing hands and wearing appropriate PPE)
- following organisational policies and standard operating procedures (SOPs), including site-specific emergency procedures
- ensuring that there is clearly visible information and guidance
- following processes for recording and reporting issues and concerns
- maintaining equipment and removing faulty equipment
- following correct manual handling techniques
- ensuring working environments are clean, tidy and hazard-free
- appropriately storing equipment and materials
- completing statutory training

A3.4 How to deal with situations that can occur in a health or science environment that could cause harm to self or others (for example, spillage of hazardous material):

- following organisational health and safety procedures
- keeping oneself and others safe, including evacuation as appropriate
- securing the area

What you need to teach
• reporting and/or escalating as appropriate • debriefing and reflecting on the root causes, to prevent the situation from recurring

A4: Health and safety regulations in healthcare science

What you need to teach
The student must understand: **A4.1 The purpose of specific health and safety regulations, guidance and regulatory bodies in relation to the healthcare science sector:** • Health and Safety (First Aid) Regulations 1981: o purpose: to set legal guidelines for employers within the healthcare science sector to provide adequate and appropriate equipment, facilities and personnel to ensure their employees receive immediate attention if they are injured or taken ill at work • Health and Care Act 2022: o purpose: improve individuals' independence and wellbeing. It makes clear that local authorities must provide or arrange services that help prevent individuals developing needs for care and support, or delay people deteriorating such that they would need ongoing care and support **A4.2 The purpose of the Human Medicines (Amendment) Regulations 2019 and the role of the Medicines and Healthcare products Regulatory Agency (MHRA):** • MHRA is a regulatory body • authorises medical products for human use: o governs the: ▪ approval of safety, efficacy and quality of a medicinal product ▪ manufacture ▪ import ▪ distribution ▪ sale ▪ supply ▪ labelling ▪ advertising **A4.3 The purpose of the Misuse of Drugs Act 1971:** • prevents the misuse of controlled drugs: o controlled drug classifications (for example, Schedule 1, 2, 3) • governs drug (except those allowed by regulation or licence from the Secretary of State):

What you need to teach
○ possession ○ supply ○ manufacture **A4.4 The requirements of national and local/organisational regulations and policies related to first aid:** • national regulations: ○ Health and Safety (First Aid) Regulations 1981: places a general duty on employers to make adequate first aid provision for employees • local/organisational policies: ○ healthcare organisations develop first aid at work policies to meet this duty, which includes having an appropriate number of trained first aiders across the organisation related to the number of employees **A4.5 The overarching responsibilities of trained first aiders:** • providing first aid treatment for minor injuries and illness • ensuring, where necessary, that the casualty is referred for further treatment, appropriate to the circumstances of the injury/illness • ensuring that the first aid box/kit for which they have responsibility is kept clean, tidy and appropriately stocked • any support provided, so far as possible, reflects an individual's needs and does not discriminate against them in any way **A4.6 The purpose of the Resuscitation Council (UK) and the guidelines that they produce:** • Resuscitation Council: ○ promotes and publishes high quality scientific resuscitation guidelines ○ develops educational materials for resuscitation ○ supports research into resuscitation • resuscitation guidelines: ○ detailed information about basic and advanced life support for a range of patients including adults, paediatrics and newborns • information for the use of external defibrillator **A4.7 The functions of the Serious Hazards of Transfusion (SHOT) haemovigilance scheme:** • collection and analysis of anonymised information on: ○ adverse events ○ blood transfusion reactions • production of annual recommendation reports designed to improve safety

A5: Providing person-centred care when working in healthcare science

What you need to teach

The student must understand:

A5.1 The National Health Service (NHS) core values and how they underpin the provision of care and support within the healthcare science sector:

- patient comes first
- compassion
- improving lives
- respect and dignity
- commitment to quality of care
- working together for service users
- everyone counts

A5.2 The purpose of quality assurance standards within the healthcare science sector:

- quality assurance framework (the Academy for Healthcare Science):
  - safety for professionals and patients
  - effectiveness of practice
  - provision of best possible experience
- quality assurance in healthcare science education:
  - quality assurance
  - quality management
  - quality control

A5.3 The importance of placing individuals, their carers and significant others at the centre of their care and support in order to ensure:

- that any care provided is in the service user's best interest
- compliance with the ethical principle of autonomy
- engagement with healthcare professionals
- holistic approaches to individuals' care provision:
  - person-centred planning (PCP)
  - person-centred care (PCC)
  - advanced care planning (for example, end of life care)

A5.4 The principles of choice and consent:

- ethical and legal requirement to gain consent for any medical care, procedure or treatment
- characteristics of valid consent:
  - informed
  - freely given
  - given by an individual with capacity to consent

What you need to teach

- provided recently
- choice considerations:
  - principles of individuals being able to opt in or out of treatment
  - right of individuals to dictate their care plan

A5.5 The consequences of undertaking a procedure without gaining consent:

- legal ramifications:
  - criminal prosecution
  - requests for compensation
- professional ramifications:
  - reputational damage
  - disciplinary action
  - dismissal
  - loss of registration to professional body

A5.6 The purpose of the NHS Constitution in setting out:

- rights of patients, the public and NHS staff
- pledges to patients, the public and NHS staff
- responsibilities of patients and the public
- principles and values of the NHS

A5.7 The role of the Care Quality Commission (CQC):

- undertake inspections/audits
- make grading decisions
- provide recommendations
- make judgements
- distribute fines (when required)
- bring legal action (when required)
- close providers (when required)

A5.8 The purpose of the Care Certificate, and who may best be suited to gain a Care Certificate:

- provide confidence that the workers have appropriate introductory skills, knowledge and behaviours to provide compassionate, safe and high quality care and support
- the Care Certificate is widely used in the health and social care sector by:
  - social workers
  - nurses
  - community support workers
  - other health and social care professionals

A5.9 The fundamentals of privacy and dignity of service users:

What you need to teach

- privacy:
  - respecting the personal space and property of patients and service users
  - ensuring the personal data is processed in a confidential manner
  - maintaining service user trust
- dignity:
  - focusing on the value of each individual
  - respecting an individual's views, choices and decisions
  - working with care and compassion
  - providing a chaperone for intimate procedures
  - communicating directly with the individual whenever possible

A5.10 Techniques that can be used to ensure terms/procedures are always clearly explained to service users/carers, taking into account their individual needs:

- checking understanding
- use of hearing loops
- use of an interpreter (for example, foreign language, sign language)
- use of appropriate reading material (for example, appropriate level, braille, alternative languages)
- use of appropriate jargon/terminology
- nonverbal communication, including body language
- taking into account individuals' capacity to understand information
- being responsive to an audience's emotional state

A5.11 The responsibilities of employees and employers in relation to equality, diversity and inclusion:

- Equality Act 2010:
  - protected characteristics
  - direct discrimination
  - indirect discrimination
- responsibilities:
  - recognise patients/service users as individuals
  - do not marginalise, label or discriminate
  - support client needs whenever reasonable

A5.12 The importance of ethics and research ethics in the healthcare science sector:

- major ethical considerations when conducting research:
  - informed consent
  - practising beneficence – doing good
  - respect for anonymity and confidentiality
  - respect for privacy
- importance of research ethics:

What you need to teach

- promote the aims of the research
- support the values of the research
- hold the researcher accountable:
  - investment is used appropriately
  - offer regulations on conflict of interest
- promote trust from the public
- support important social and moral values

A5.13 The definition of 'duty of care':

- moral or legal obligation to ensure the safety or wellbeing of others

A5.14 The role of regulating bodies/acts relevant to the 'duty of care' in healthcare science and medical professions:

- Health and Care Professions Council (HCPC):
  - main awarding organisation for statutory registration
  - protected title can carry out certain tasks and meet standards with patient training, need to follow standards and maintain fitness to practise
  - investigates concerns raised about registrants
- Academy for Healthcare Science (AHCS):
  - voluntary regulation body
  - not mandatory to be registered
  - mirrored for statutory regulation
  - not technically a legal requirement, but employers would often expect this
- General Pharmaceutical Council (GPhC):
  - statutory registration body
  - sets standards for pharmaceutical education and training, performance and conduct
  - inspects pharmacies
  - investigates complaints
- General Medical Council (GMC):
  - principles of GMC regulations:
    - National Institute for Health and Care Excellence (NICE) guidelines
  - guidance and advice for specific areas of health and social care
- Care Quality Commission (CQC):
  - setting standards for individual care
- General Dental Council (GDC):
  - statutory registration body
  - primary purpose to protect patient safety and maintain public confidence in dental services
  - sets standards for dental education and training, performance and conduct
  - investigates complaints

What you need to teach

- General Optical Council (GOC):
  - statutory registration body
  - sets standards for optical education and training, performance and conduct
  - investigates complaints

A5.15 The consequences of not maintaining 'duty of care':

- poor patient outcomes
- organisational reputational damage or failure
- professional reputational damage
- reduction or breakdown in communication
- decrease in public confidence
- economic impact

A5.16 The purpose of the relevant legislation in the healthcare science sector, in relation to rights of the individual:

- Employment Relations Act 2004:
  - amended UK law around trade union membership and industrial action
- Employment Rights Act 1996:
  - covers major aspects of relations under employment, including particulars of employment, leave, study or training and termination
  - provides protection of wages and payments
- Data Protection Act 2018 (DPA):
  - controls how individuals' personal information is used by organisations, businesses and the government
  - implementation of UK GDPR
- Public Interest Disclosure Act (PIDA) 1998:
  - protects whistle blowers from detrimental treatment from their employer

A5.17 The importance and application of probity and candour in a healthcare science setting:

- demonstrating integrity
- building trust with service user
- acting without discrimination
- respecting service users' dignity and choices
- being open and honest with service users

A5.18 The consequences of failing to maintain the duty of candour:

- failure to build rapport with service users
- decrease in open and honest communication with service users
- poor patient outcomes
- organisational reputational damage or failure

What you need to teach

- professional reputational damage
- decrease in public confidence
- economic impact

A5.19 The principles of the 6 Cs:

- care:
  - helps the individual and improves the health of the whole community
- compassion:
  - helps to build relationships based on empathy, respect and dignity
- communication:
  - listening and communication skills – ensuring clear record-keeping, reporting and monitoring of patient records and other documentation
- courage:
  - doing the 'right thing' at all times and reporting concerns
- commitment:
  - striving to provide the best possible care for patients/service users
- competence:
  - confidence and capability to undertake work

A5.20 The relationship between partnership working and the provision of person-centred care:

- how and why practitioners work in partnership:
  - multi-agency: organisations (agencies) working together to meet a service user's needs
  - multi-disciplinary: healthcare practitioners with different roles and responsibilities (disciplines) working together to meet a service user's needs
  - inter-professional learning (for example, cross-skill training)
  - patient advocacy (gives patients a voice)
- roles and responsibilities of practitioners within partnership working:
  - disseminate information
  - exchange knowledge, understanding and skills
  - carry out health and care assessments
  - protect and safeguard
  - manage risk
  - make referrals
  - advocate
  - secure resources

A5.21 The principles of safeguarding, found in the Health and Care Act 2022:

- the 6 principles of adult safeguarding:
  - empowerment

What you need to teach

- prevention
- protection
- partnership
- proportionality
- accountability

A5.22 The signs and symptoms of different types of abuse and harm:

- types of physical abuse and harm:
  - breast ironing
  - female genital mutilation
  - sexual
  - hitting
- possible signs of physical abuse and harm:
  - bruising
  - unexplained bleeding
- types of emotional/psychological abuse and harm:
  - belittling
  - bullying
  - verbal abuse
  - gaslighting
- possible signs of emotional/psychological abuse and harm:
  - depression
  - low self-esteem
- types of organisational abuse:
  - regimented mealtimes
  - removing personal choices
- possible signs of organisational abuse:
  - restricted visiting times
  - patient complaints
- types of financial abuse:
  - withholding/taking of money
- possible signs of financial abuse:
  - lack of money and/or belongings
  - debt
- types of neglect:
  - self-neglect
  - neglect by others

What you need to teach

- possible signs of neglect:
  - unkempt appearance
  - malnutrition

A5.23 Signs and symptoms of radicalisation as outlined in the Prevent strategy 2011:

- signs of radicalisation in an individual, including:
  - unusual/scripted speech content
  - unwillingness or inability to discuss their views
  - disrespectful attitude
  - increased levels of anger
  - intentional isolation

A5.24 How individuals' mental and physical capacity can influence their needs in relation to overall care:

- mental health capacity:
  - neurodiversity conditions (for example, attention deficit hyperactivity disorder (ADHD), dyslexia, dyspraxia, autism spectrum):
    - extra communication considerations/requirements
    - comprehension considerations
    - extra monitoring requirements
    - specific care needs
  - learning disability (for example, Down's syndrome, cerebral palsy, global developmental delay syndrome):
    - extra communication considerations/requirements
    - comprehension considerations
    - extra monitoring requirements
    - specific care needs
    - issues around consent
- physical capacity:
  - physical disability (for example, spinal cord injury, arthritis, musculoskeletal injuries):
    - accessibility requirements
    - design considerations for any medical products
    - appropriate administration of medication based on physical factors
    - visual and hearing impairment
    - extra communication considerations/requirements

A5.25 The impact of dementia on an individual's needs:

- may require support with day-to-day living
- treatment requirements:
  - care plan
  - consent considerations

What you need to teach

- trials and medical research
- variability of support requirements
- appropriate person with power of attorney (financial and medical) and their implications for care

A5.26 The impact of learning difficulties on an individual's needs:

- requirement to adopt appropriate communication methods
- tailor care appropriately to capacity and condition
- empathic support
- social and community support (for example, charities, religious communities, carers, family)
- point of care testing requirements

A5.27 How to promote independence and self-care strategies:

- education and empowerment of the service user:
  - health tracking (for example, use of personal tracking apps)
  - education:
    - emotional intelligence (for example, assisting service users in understanding their own emotions)
    - health and wellbeing (for example, diet)
    - self-care strategies (for example, personal hygiene)
- effective communication to patients/service users:
  - explaining strategies clearly
  - signposting to useful groups and resources (for example, local and national information and support services)
  - positive role modelling

A5.28 The positive effects of promoting independence and self-care:

- improved active participation
- improved self-esteem and independence
- improved partnership working
- improved healthcare staff time efficiency

A5.29 The overarching principle of the delivery of health promotion through the Making Every Contact Count (MECC) initiative and the risk factors this initiative targets:

- using brief and very brief interventions whenever the opportunity arises (for example, during routine appointments)
- highlighting risk factors including:
  - smoking
  - poor diet
  - alcohol consumption
  - physical activity levels
  - mental health and wellbeing

What you need to teach

- social prescribing:
  - linking individuals to services in the community
- signposting individuals to services and resources

A5.30 Strategies for promoting health and wellbeing within all aspects of care:

- Making Every Contact Count (MECC):
  - healthy conversations, stressing the importance of:
    - healthy eating
    - regular exercise
    - reducing health risks such as alcohol consumption and smoking
- signposting to appropriate services
- promoting public health:
  - primary prevention

A5.31 Methods of obtaining feedback from service users relating to their experience of contacts and treatments:

- surveys:
  - customer experience questionnaires
- verbal feedback
- treatment success/visible results

A5.32 Methods of using feedback obtained from service users to drive improvements in the healthcare science sector:

- introduce service improvement:
  - amending and adapting
- monitor performance:
  - departmental
  - individual
  - service as a whole
  - friends and family test
- budgeting:
  - keeping/maintaining existing services
  - applying for funds to improve/introduce new services
- introducing new services

A5.33 The definition of an urgent or immediate referral and factors that would dictate the need for this action:

- definition of urgent or immediate referral:
  - admission or referral occurring within a few hours, or even more quickly if necessary
- factors that would dictate the need for urgent or immediate referral:

What you need to teach

- severity of condition (for example, severe, life-limiting):
  - including consideration of underlying health conditions
- rapidity of symptom progression
- issue beyond scope of practice

A5.34 The functions of services that work with urgent or immediate referral:

- NHS Urgent and Emergency Care (UEC) services:
  - patients presenting at hospital can be assessed, diagnosed, treated and discharged on the same day if clinically safe to do so, rather than being admitted to hospital
- NHS Urgent Treatment Centres (UTCs):
  - general practitioner (GP) led
  - offer appointments through 111
  - equipped to deal with most common ailments which people attend A&E with, but are not life-threatening
- NHS 111:
  - assists the public with urgent medical problems
  - answers questions on main symptoms
  - refers to other services when appropriate
- NHS Accident and Emergency (A&E):
  - treats major, life-threatening illnesses, injuries and emergencies

A5.35 How to act on urgent or immediate referrals appropriately within limitations of role:

- understanding of the steps and procedures involved
- communication of process to service users
- duty of care to service user:
  - duty to refer
  - care and compassion
- confidentiality:
  - gathering evidence
  - dealing with data safely
  - sharing information appropriately
  - commitment to those involved
- follow up on the situation:
  - update those involved at regular intervals

A6: Infection prevention and control in healthcare science settings

What you need to teach

The student must understand:

A6.1 Techniques for the prevention and control of infection in healthcare science settings, including use of appropriate personal protective equipment (PPE), appropriate cleaning and disinfecting:

- techniques for infection control:
  - use of PPE (for example, aprons, gloves, face coverings)
  - appropriate order of PPE donning and doffing
  - appropriate fit and quality control of face masks
  - use of cleaning and disinfecting agents (for example, appropriate dilutions)
  - effective handwashing techniques (for example, the 5 steps of hand hygiene)
  - good personal hygiene (for example, hair tied up and clean uniform)
  - 'nothing below the elbow' in clinical situations
  - isolation period when sick, where applicable
- laboratory-specific infection control measures:
  - laboratory-specific PPE (for example, coats and glasses)
  - containment barriers
  - air pressure/air flow cabinets
  - category 1 and 2 safety cabinets
  - item-specific considerations (for example, closing lids on analysers)
- why control measures are important to prevent the spread of infection within the healthcare science setting:
  - prevent harm caused to both patients and health workers
- local dress code policy:
  - hair
  - uniform
  - jewellery

A6.2 The difference between single-use and multiple-use products and the main reasons for using single-use products:

- single-use products:
  - used with/on an individual patient, during a single procedure and then discarded
  - product is not intended ever to be used again, even with same patient
  - packaging clearly indicates that product is single-use
  - patient products include peak expiratory flow breathing tubes, swabs, needles and catheters
  - PPE equipment, including gloves and masks, may also be single-use
  - laboratory consumables (for example, disposable pipettes)
- multiple-use products:

What you need to teach

- used multiple times on different patients
- require cleaning, sterilisation, or disinfection dependent on the product
- examples include blood pressure cuffs and some surgical instruments
- laboratory equipment (for example, analysis equipment such as centrifuges)

- main reasons for using single-use products:
  - improved patient safety as significantly reduces risk of infection and cross-contamination
  - convenience, as products do not require any cleaning or sterilising

A6.3 The scientific principles of cleaning, disinfecting, sterilisation and decontamination:

- principles:
  - cleaning:
    - physically reduces the presence of microorganisms that may be present on surfaces through the removal of visible foreign material; this minimises the risk of transfer of microorganisms
  - disinfecting:
    - using a specific chemical disinfectant or physical disinfection (such as heat) reduces non-visible pathogenic microorganisms by destroying cell wall or interfering with metabolism
  - sterilising:
    - this is the complete elimination of all microorganisms
  - decontaminating:
    - overarching process used to describe cleaning, disinfection and sterilisation

A6.4 The principles of a range of sterilisation techniques and the effect of sterilisation on materials:

- autoclaving wet/dry methods:
  - use of highly pressurised steam to sterilise heat-resistant equipment
- chemical sterilisation:
  - use of a solvent diluted with water for quick sterilisation of surfaces and equipment
- radiation sterilisation:
  - use of ionising radiation to sterilise single-use medical equipment such as PPE

A6.5 The importance of effective handwashing techniques:

- 5 moments of hand hygiene
- infection control:
  - poor hand hygiene is the most common cause of transmission in most healthcare settings
- maintenance of sterile environments
- enhancing patient safety
- personal skincare following repeated handwashing

A6.6 The impact of antimicrobial resistance on infection prevention and control:

- antibiotic stewardship
- antibiotic resistance:

What you need to teach

- prolongs illness
- restricts choice

- antibiotic overuse:
  - causes resistance and outbreaks, which leads to increased burden on healthcare providers and/or increased mortality

A6.7 The process of waste management and waste streams, taking into account how to reduce waste:

- general waste:
  - general waste and cardboard
  - recycles plastics, cardboard and packaging
  - confidential waste is shredded and recycled
- glassware waste:
  - split into brown and clear glass
  - glassware is recycled
- electrical waste:
  - salvage waste and use or sell valuable parts
  - batteries are recycled

A6.8 Considerations that must be made when deciding upon appropriate waste streams for various types of special and hazardous waste products:

- waste streams dependent on type of waste:
  - infectious waste sent for incineration (for example, laboratory specimens)
  - infectious waste can be sent for treatment to render it safe for disposal (for example, PPE)
  - waste containing cytotoxic or cytostatic medicine must be incinerated at an authorised facility (for example, used sharps)
  - offensive/hygiene waste may be sent for recycling at an 'energy from waste' facility (for example, PPE with no infection risk)
  - anatomical waste sent for incineration at a suitably authorised facility (for example, placenta)
  - non-hazardous medicinal waste sent for incineration at a suitably authorised facility (for example, waste medicines)
  - dedicated clothing sent to dedicated, specialist cleaners on site or to a third-party

A6.9 The types of spillage that can occur and the associated risks:

- bodily fluids (for example, urine, faeces, vomit):
  - infection
- slip and trip:
  - aerosol created as vomit lands on ground
- blood:
  - infection
  - slip and trip

What you need to teach

- chemical (for example, liquid, gas, solid, aerosol):
  - injury
  - burn
  - breathing issues through inhalation
  - slip and trip

A6.10 Corrective and preventative actions that can be taken in relation to spillages:

- corrective:
  - follow organisational policies and procedures:
    - follow appropriate SOPs
    - use appropriate PPE (for example, ensure correct spillage PPE is worn)
    - reporting procedures (for example, ensure Datix form is completed and health and safety officer informed)
  - erect warning signs
  - use appropriate materials to absorb spillage as much as possible (for example, ensure boom material from spillage kit is used and disposed of appropriately)
  - cleaning with warm water and detergent of appropriate concentration
- preventative:
  - follow SOPs
  - follow appropriate storage techniques (for example, ensure samples are stored in appropriate racks at all times)
  - use appropriate transportation techniques (for example, chemical bottle carriers):
    - use dedicated location (where appropriate)

A7: Managing information and data within the health and science sector

What you need to teach

The student must understand:

A7.1 A range of methods used to collect data:

- focus groups
- open-question surveys/interviews
- observation
- public databases
- journals and articles
- carrying out practical investigations
- closed-question surveys
- official statistics

What you need to teach

A7.2 The considerations to make when selecting a range of ways to collect and record information and data:

- data type: qualitative or quantitative data (for example, laboratory results versus patient history)
- the most appropriate method of data collection (manual versus automated)
- the most appropriate way to present the information or data (for example, graphs, charts and tables)
- depth of analysis required (spreadsheets and databases)
- the intended audience
- storage method (for example, digital or paper-based)

A7.3 The importance of accuracy, attention to detail and legibility of any written information or data in order to:

- comply with legal requirements (for example, UK GDPR)
- limit liability (for example, ensuring anonymity and informed consent)
- provide an accurate account of events
- inform integrated working and data sharing
- ensure accurate analysis of findings
- support with audit trails
- ensure reproducibility of results

A7.4 The strengths and limitations of a range of data sources when applied in a range of health and science environments:

- results of investigations:
  - strengths (for example, consistent results produced under controlled conditions)
  - limitations (for example, possibility of over-extrapolation)
- patient history:
  - strengths (for example, provides detailed information over time)
  - limitations (for example, may not be accurate or complete)
- patient test results:
  - strengths (for example, laboratory and test accreditation ensures standardisation)
  - limitations (for example, results are open to subjectivity)
- published literature:
  - strengths (for example, peer review improves validity)
  - limitations (for example, could be based on small-scale/biased research or come from fraudulent sources)
- real-time observation:
  - strengths (for example, immediate data)
  - limitations (for example, possible subjectivity)

A7.5 How new technology is applied in the recording and reporting of information and data:

What you need to teach

- artificial intelligence (AI)/machine learning (for example, use of bioinformatics tools to analyse and process large data sets)
- mobile technology and applications (for example, to capture health informatics and location data - track and trace)
- cloud-based systems (for example, use of electronic health records (EHRs); easier to share data for further analysis)
- digital information management systems (for example, to enable a digital audit trail)
- data-visualisation tools (for example, to consolidate multiple data sources for presentation)

A7.6 How personal information is protected by data protection legislation, regulations and local ways of working/organisational policies:

- Data Protection Act 2018:
  - controls the use of personal information by organisations, businesses or the government
- UK GDPR:
  - provides a set of principles with which any individual or organisation processing sensitive data must comply
- local ways of working/organisational policies to ensure compliance with legislation and regulations, depending on the sector:
  - ensuring that data is stored securely (electronically or paper-based)
  - restricting the use of mobile devices in order to ensure confidentiality
  - preventing potential conflicts of interest

A7.7 How to ensure confidentiality when using screens to input or retrieve information or data:

- logging out of a system when leaving the screen
- protecting login and password information
- being aware of the surroundings
- using secure internet connections
- using privacy screen filters where appropriate

A7.8 The positive use of, and restrictions on the use of, social media in health and science sectors:

- positive uses:
  - awareness campaigns/disseminating information
  - correcting misinformation
  - crisis communication/monitoring
  - monitoring public health
  - data gathering
  - establishing support networks
  - recruitment
  - marketing
- restrictions:
  - not posting sensitive/personal information about oneself or others on social media, in line with an

What you need to teach
organisation's code of conduct ○ maintaining professional boundaries when interacting with individuals external to the organisation ○ sharing inaccurate/non-evidence-based information **A7.9 The advantages and risks of using IT systems to record, retrieve and store information and data:** • advantages: ○ ease of access ○ ease of sharing and transferring data ○ speed of data analysis ○ security (for example, password-protected) ○ standardisation of data ○ enables continuous and/or real-time monitoring of data ○ cost and space saving ○ enables integrated working and supports safeguarding practices • risks: ○ security breaches – accidental or malicious ○ potential for corruption of data ○ lack of access due to system failure **A7.10 How security measures protect data stored by organisations, by:** • controlling access to information (for example, levels of authorised logins and passwords) • allowing only authorised staff into specific work areas • requiring regular and up-to-date staff training in complying with data security • making regular back-ups of files • using up-to-date cyber security strategies to protect against unintended or unauthorised access • ensuring that back-up data is stored externally (for example, cloud-based or separate servers) **A7.11 What to do if information is not stored securely:** • secure the information where possible • record and report the incident to the designated person, following organisational policies and procedures

A8: Managing information and data

What you need to teach

The student must understand:

A8.1 The range of methods of recording and reporting service user information and data:

- physical records (for example, images):
  - X-ray
  - computed tomography (CT) scan
  - retinal images
- photographs:
  - dental moulds
- digital records/written notes:
  - prescription
  - patient notes
  - clinical observations/charts
  - test results
  - photographs

A8.2 The responsibilities of employees and employers relating to the safe storage of data and notification of insecure data practices:

- ensure the safe storage of data by:
  - following recording and reporting requirements (for example, data breach notification)
  - securing the information where possible
  - recording and reporting incidents to the designated person (for example, data protection officer (DPO))
- follow organisational policies and procedures:
  - information security management system (ISMS) procedures

A8.3 The limits of confidentiality where self-harm or harm to others may be involved with reference to:

- safeguarding:
  - Liberty Protection Safeguards (LPS)
- duty of care
- consent:
  - covert administration of medication
- compliance with legal requests
- Freedom of Information Act 2000

A8.4 The purpose of different types of statistical databases and software tools used to integrate, analyse and interpret data:

- Statistical Package for Social Sciences (SPSS):
  - used for complex statistical data analysis

What you need to teach

- Statistical Analysis System (SAS):
  - reads data from spreadsheets and databases and places them into an output such as tables graphs and documents
- Software for Statistics and Data Science (Stata):
  - general purpose software package
- spreadsheets:
  - basic statistical tool

A8.5 The role of bioinformaticians and data scientists:

- responsible for bringing together information technology and healthcare science (for example, DNA sequencing)
- design clinical trial methodology
- construction of survey methodology for gathering of feedback
- collection of healthcare science data
- interpretation of healthcare science data
- development of databases for research purposes

A8.6 The advantages of reporting systems for managing information with regards to incidents, events and conditions:

- reduce errors in information records
- timely reporting of information
- easy access to patient information for tracking or monitoring
- insurance (for example, easier to validate claim)

A8.7 Factors which would dictate the need to escalate issues relating to service user information:

- suspected overuse/abuse of medication
- breach of confidentiality
- suspected self-harm
- safeguarding concerns
- information technology (IT)/data breaches
- safe haven failure
- loss/misplacement of data
- suspicions of bribery and corruption
- unauthorised sharing of information online (for example, on social media platforms)

A8.8 The principles of methods of statistical analysis and interpretation that can be applied to data:

- descriptive statistics:
  - summarise data from samples using indexes:
    - mean
    - standard deviation

What you need to teach

• inferential statistics:
  ○ draws conclusions from data that are subject to random variations:
  ▪ sampling variation
  ▪ observing errors
A8.9 Different formats for communicating and presenting data and how to adapt communication style where appropriate:
• formats for sharing information:
  ○ oral reports (for example, to give immediate information or during a handover)
  ○ written papers/reports (for example, research papers/reports)
  ○ forms and documents (for example, medical history)
  ○ presentations (for example, to share good practice in a team meeting or report findings of a research project)
  ○ graphs and tables (for example, to summarise research findings)
  ○ leaflets or posters (for example, to provide information about treatment options)
  ○ web pages and social media (for example, to provide information about health promotion initiatives)
• how to adapt communication style to suit target audience:
  ○ choose the appropriate tools to represent the information, including digital and non-digital methods (for example, use of non-digital methods for users who find IT challenging)
  ○ organise information in a logical, coherent way to support the length and purpose of information being shared

A9: Good scientific and clinical practice

What you need to teach
The student must understand: **A9.1 The principles of good practice in scientific and clinical settings:** • using standard operating procedures (SOPs) • effectively managing calibration and maintenance of equipment and work areas • effectively managing stock • appropriately storing products, materials and equipment **A9.2 What a SOP is:** • a set of sequential steps or instructions designed to standardise the approach to a process or action **A9.3 Why it is important for everyone to follow SOPs:** • maintaining health and safety • enabling consistency of approach

What you need to teach

- meeting any legal or organisational requirements
- upholding professional standards
- demonstrating compliance for audit purposes

A9.4 How to access SOPs for a given activity:

- carrying out detailed index searches (for example, via intranet/manual)
- completing detailed staff induction and ongoing training
- ensuring the SOP is the most up-to-date version
- ensuring all relevant documentation has been completed and signed

A9.5 The potential impacts of not regularly cleaning and preparing work areas for use:

- risks to health and safety:
  - spread of infection
  - production of toxic/dangerous by-products
- invalid results:
  - contamination or cross-contamination (for example, environmental, samples, reagents, DNA)
- inefficient working practices:
  - leads to increased costs and timescales
- damage to equipment:
  - leads to increased costs and timescales

A9.6 The potential impacts of not maintaining, cleaning and servicing equipment:

- risks to health and safety:
  - increased risk of injury
  - spread of infection
- invalid results:
  - contamination or cross-contamination (for example, environmental, samples, reagents)
- reduced function of equipment:
  - decreased lifespan of equipment
  - increased cost and timescales (for example, due to repair of equipment and equipment being out of service)

A9.7 Why it is important to calibrate and test equipment to ensure it is fit for use:

- ensuring accuracy of measurements
- prolonging the life of equipment
- meeting legal requirements

A9.8 How to escalate concerns if equipment is not correctly calibrated/unsuitable for intended use:

- taking the equipment out of action
- labelling the equipment as being out of use, if appropriate

What you need to teach

- reporting concerns to the relevant person, in line with organisational policies and procedures
- recording concerns according to organisational procedures

A9.9 Why it is important to order and manage stock:

- ensuring sufficient supply of required consumables and materials
- ensuring that materials are used before their expiry date
- reducing the costs of excess stock
- improving efficiency
- improving productivity
- ensuring safety of stock (bottles are not damaged/degraded)

A9.10 The potential consequences of incorrectly storing products, materials and equipment:

- cross-contamination
- breakdown of limited stability products
- products exceeding expiry dates
- loss of samples or degradation of reagents not stored at the correct temperature (-20°C, -4°C, 4°C or room temperature)
- risks to health and safety (for example, spread of infection, release of dangerous chemicals, or heavy items not stored at correct height)
- stock is difficult to locate
- financial loss

A10: Good scientific practice

What you need to teach

The student must understand:

A10.1 The 5 domains of good scientific practice (GSP):

- professional practice:
  - probity
  - working with colleagues
  - training and developing others
- scientific practice:
  - technical practice
  - quality
  - documenting
- clinical practice:
  - investigation and reporting

What you need to teach

- research, development and innovation
- clinical leadership

A10.2 The importance of good laboratory practice (GLP):

- used most often in academic environments and laboratories (non-clinical)
- outlines the requirements for quality assurance of process and conditions
- sets minimum standards of suitability of facilities and equipment
- sets results recording and reporting requirements
- 10 sub-divisions:
  - organisational and personnel
  - quality assurance program
  - facilities
  - equipment, reagents and materials
  - test systems
  - test and reference item
  - standard operating procedures (SOPs)
  - performance of study
  - reporting of results
  - archival – storage of records and reports

A10.3 The importance of following good manufacturing practice (GMP) and basic requirements for the production of medical products:

- products to be of consistent high quality
- product and constituent materials to be appropriate for intended use
- products meet the product specification
- used most often in pharmaceutical companies and kit manufacturers
- 11 sub-divisions:
  - clean and hygienic manufacturing area
  - controlled environment (protect against cross-contamination)
  - clearly defined and controlled process
  - good documentation practices (for example, process is clearly recorded)
  - any proposed process changes require evaluation
  - records must be maintained (manual or electronic)
  - all personnel should have appropriate job training
  - production and distribution records must be retained
  - distribution means and channels must minimise risk to product quality
  - recall system must be in place
  - proper complaints procedure established and carried out in full

What you need to teach

A10.4 How application of quality management policies and procedures facilitates continuous service improvement:

- use of a mission statement
- SOPs
- establishing an evidence base for practice
- planning and monitoring service provision:
  - manage quality
  - analyse quality-based information
  - audit cycle
  - verify compliance
- regular service quality improvement meetings
- evaluating, identifying and implementing improvements (corrective and preventative action (CAPA) process)
- enforcing legislative requirements

A10.5 The requirements within GSP for the handling of hazardous materials and substances:

- identifying and managing sources of workplace risk (for example, specimens, clinical waste)
- application of health and safety practice to all areas of the workplace
- refer to and adhere to Control of Substances Hazardous to Health (COSHH) assessment (where applicable) and/or SOPs
- application of correct methods of disinfection, sterilisation and decontamination when dealing with waste and/or spillage
- maintain and apply quality standards across all clinical, scientific and technological activities:
  - quality control
  - quality assurance
- protect patients from risk or harm at all times

Core component (section B: science concepts)

B1: Core science concepts

What you need to teach

The student must understand:

Cells and tissues

B1.1 The 3 principles of cell theory:

- all living things are made up of one or more cells
- cells are the most basic unit of structure and function in all living things
- all cells are created by pre-existing cells

B1.2 The different types of cells that make up living organisms:

- eukaryotic cells (for example, plant, yeast, algae and animals)
- prokaryotic cells (for example, bacteria)

B1.3 The structure and function of the organelles found within eukaryotic cells, including:

- cell-surface membrane
  - control of passage of substances into and out of the cell
  - site of antigens
- nucleus
  - contains chromosomes
- mitochondria
  - respiration producing adenosine triphosphate (ATP)
- ribosomes
  - protein synthesis / translation
- rough and smooth endoplasmic reticulum
  - protein synthesis and packaging
  - lipid synthesis and storage
- Golgi apparatus and Golgi vesicles
  - packaging of proteins for transport
- centrioles
  - involved with separation of chromosomes during cell division
- lysosomes
  - digestion / breakdown of worn out cell parts and invading microbes
- chloroplasts (in plants)
  - photosynthesis
- cell wall (in plants)

What you need to teach

- structure and protection
- cell vacuole (in plants)
  - store water and maintain internal hydrostatic pressure

B1.4 The similarities and differences between plant and animal cells in relation to the presence of specific organelles and their function:

- overall cell shape
- presence of the same organelles
- presence of different organelles for specialised functions (for example, chloroplasts)

B1.5 How eukaryotic cells become specialised in complex multi-cellular organisms:

- eukaryotic cells are specialised to perform particular functions
- specialisation occurs through differentiation from stem cells
- examples of specialised cells, such as different types of blood cell

B1.6 How prokaryotic cells differ from eukaryotic cells:

- they have cytoplasm that lacks membrane-bound organelles
- they have smaller ribosomes
- they have no nucleus; instead, they have a single circular DNA molecule that is free in the cytoplasm and is not associated with proteins
- they have a cell wall that contains murein/peptidoglycan and glycoprotein
- they may have one or more plasmids
- they may have a capsule surrounding the cell
- they may have one or more simple flagella

Proteins

B1.7 The relationship between the structure, properties and functions of proteins:

- amino acids are the small molecules (monomers) from which all proteins are made
- amino acids contain NH_2 which is the amine group, COOH represents a carboxyl group and R represents a side chain
- there are 20 amino acids common in organisms, each differs by the side chain (R)
- dipeptides are formed by the condensation of 2 amino acids
- polypeptides are formed by the condensation of many amino acids
- functional proteins, such as fibrous proteins or globular proteins, contain a number of polypeptide chains which will determine the shape and size and function

Carbohydrates

B1.8 The relationship between the structure, properties and functions of carbohydrates:

- monosaccharides are the small molecules (monomers) from which all larger carbohydrates are made (disaccharides and polysaccharides)

What you need to teach

- glucose, galactose and fructose are common monosaccharides
- disaccharides are formed from 2 monosaccharides (for example, maltose and sucrose)
- polysaccharides are formed from many monosaccharide molecules
- as polysaccharides are such large molecules, they are usually insoluble which makes them suitable to carry out storage and support functions (for example, glycogen, starch and cellulose)

Lipids

B1.9 The relationship between the structure, properties and functions of lipids:

- lipids are a diverse group of substances which all contain carbon, hydrogen and oxygen
- they are generally insoluble in water
- the main groups of lipids are triglycerides (for example, fats and oils) and phospholipids
- the main role of phospholipids is in plasma membranes to provide flexibility and transport mechanisms
- other roles of lipids include providing an energy store, insulation and protection

Exchange and transport mechanisms

B1.10 How the surface area to volume ratio affects the process of exchange and gives rise to specialised systems:

- the surface area must be large in comparison to the volume for efficient exchange
- where the surface area is small compared to the volume, specialised exchange and transport mechanisms are required to maximise the rate of diffusion
- additional factors, such as diffusion distance, temperature and metabolic rate

B1.11 The principles of cellular exchange and the transport mechanisms which exist to facilitate this exchange:

- the structure of the cell surface membrane with reference to the fluid mosaic model
- passive transport through the cell surface membrane: diffusion, facilitated diffusion and osmosis
- active transport through the cell surface membrane
- co-transport mechanisms

B1.12 The advantages of having specialised cells in relation to the rate of transport across internal and external membranes

Genetics

B1.13 The purpose of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) as the carrying molecules of genetic information and the role they play in the mechanism of inheritance:

- DNA holds genetic information
- RNA transfers genetic information from DNA to the ribosomes where proteins are synthesised

B1.14 The relationship between the structure of DNA and RNA and their role in the mechanism of inheritance:

- nucleotides are the molecules (monomers) from which DNA and RNA are formed
- each nucleotide is formed from pentose, a nitrogen-containing organic base and a phosphate group

What you need to teach

- the components of a DNA nucleotide are deoxyribose, a phosphate group and one of the organic bases (adenine, cytosine, guanine or thymine)
- the components of an RNA nucleotide are ribose, a phosphate group and one of the organic bases (adenine, cytosine, guanine or uracil)
- a condensation reaction between 2 nucleotides forms a phosphodiester bond
- a DNA molecule is a double helix with 2 polynucleotide chains held together by hydrogen bonds between specific complementary base pairs
- an RNA molecule is a relatively short single stranded polynucleotide chain

B1.15 The function of complementary base pairing in forming the helical structure of DNA

B1.16 The process and stages of semi-conservative replication of DNA:

- DNA is progressively unwound
- breakage of the hydrogen bonds between complementary bases
- this leaves 2 chains with unpaired bases
- each chain then acts as a guiding base (or template) for the building of a new strand
- role of DNA helicase and DNA polymerase in this process

B1.17 How this semi-conservative replication process ensures genetic continuity between generations of cells

B1.18 The link between the semi-conservative replication process and variation:

- a mutation (spontaneous change in the DNA sequence) can lead to genetic variation

B1.19 The difference between genetics and genomics:

- genetics focuses on the functioning and composition of single genes
- genomics focuses on the entire genetic material of an organism (including coding and non-coding DNA)

Microbiology

B1.20 The classification and characteristics (size of cell, type of cell, presence of organelles) of the following microorganisms:

- bacteria
- fungi
- parasites
- viruses

B1.21 The benefits of using the following microscopes when investigating microorganisms:

- light microscopes:
  - low cost
  - easy to use (requires little training)
  - allows for examination of living microorganisms

What you need to teach

- scanning electron microscopes:
  - higher resolution
  - reveals more surface detail
  - displays a 3D view of the surface
- transmission electron microscopes:
  - higher resolution
  - reveals internal structures
  - displays a 2D view of the inner surface

B1.22 How to calculate magnification from the size of the image and the size of the object:

- magnification= $\frac{\text{size of image}}{\text{size of object}}$

B1.23 The uses of differential staining techniques:

- Gram staining:
  - to identify Gram- and Gram+ bacteria
- Giemsa staining:
  - to identify specific bacteria (for example, Chlamydia trachomatis) or parasites (malarial)
  - to identify any pathophysiology of blood cells
- haematoxylin and eosin staining:
  - staining human or animal tissue in order to give a differentiated image of the nuclear and cytoplasmic components of a cell

Immunology

B1.24 The nature of infection:

- a microorganism replicating inside the body, resulting in disease

B1.25 Pathogens (causative agents) of infection and examples of resulting diseases:

- bacteria (for example, chlamydia, gonorrhoea, tuberculosis)
- viruses (for example, common cold, mumps and measles)
- fungi (for example, yeast infection (thrush))
- prions (for example, Creutzfeldt-Jakob disease (CJD))
- protists (for example, malaria)
- parasites (for example, toxoplasmosis)

B1.26 The different ways in which pathogens (causative agents) may enter the body (for example, transmission routes):

- direct transmission:
  - physical contact with an infected person or contaminated surface (for example, skin-to-skin contact)
  - sharing of needles
  - unprotected sexual contact

What you need to teach

- airborne: pathogens (causative agents) is carried by dust or droplets in the air and can exist in the air for some time (for example, inhaling infected droplets)

- indirect transmission:
  - vehicle transmission (for example, ingesting infected food or water (faecal-oral)); blood from inanimate objects (for example, bedding)
  - being bitten by an infected 'vector' (for example, insect bites)

B1.27 How infectious diseases can spread amongst populations and communities:

- inadequate sanitation (for example, lack of access to clean water and inadequate sewage disposal)
- dense populations (social distancing)
- inadequate healthcare/infrastructure
- lack of accessible health promotion information

B1.28 The definition of an antigen and an antibody:

- antigen – a substance that is recognised by the immune system as self or non-self and stimulates an immune response
- antibody – a blood protein produced in response to, and counteracting, a specific antigen

B1.29 The link between antigens and the initiation of the body's response to invasion by a foreign substance:

- antigens as chemical markers
- ability of the body to recognise self and non-self-antigens

B1.30 The stages and cells involved in the body's response to an antigen, including:

- use of physical and chemical barriers
- inflammation
- phagocytosis
- actions of T cells
- actions of B cells

B1.31 The differences between cell-mediated immunity and antibody-mediated immunity, including:

- cell-mediated response is associated with T-lymphocytes destroying pathogens (causative agents) without producing antibodies
- antibody-mediated response is associated with B-lymphocytes destroying pathogens (causative agents) by producing antibodies against it

B1.32 The role of T and B memory cells in the secondary immune response:

- they trigger a stronger and more rapid immune response after encountering the same antigen
- role of vaccinations in relation to T and B memory cells

Materials and chemical properties

What you need to teach

B1.33 The relationship between the atomic structure and physical and chemical properties of metals, including:

- physical properties:
  - conductivity (electrical and thermal)
  - malleability/ductility
  - strength
- chemical properties:
  - group 1:
    - reactivity of group 1 metals with water and oxygen
    - reactivity of group 1 metals in terms of their electronic configurations
  - transition metals:
    - reactivity of transition metals with oxygen and acids
    - the difference in properties of transition metals compared with group 1 metals in their melting points, densities, strength, hardness and reactivity with oxygen, chlorine and water
- the relationship between the structure and properties of the following materials:
  - composite materials (for example, concrete, fibreglass and carbon fibre):
    - structure – made of 2 or more materials with different properties to combine those properties into one material
    - properties (strong, lightweight)
  - ceramics (for example, clay and glass):
    - structure – moulded and then baked to form strong bonds between atoms in the structure
    - properties – hard, strong under compression, chemically unreactive
  - polymers (for example, high density (HD) and low density (LD) polyethene, thermosetting and thermosoftening polymers):
    - structure (long chain molecules with forces or bonds between the chains)
    - properties (strong, chemically unreactive, electrical insulators)
    - how the properties of these materials are related to their uses

B1.34 How the arrangement of electrons is linked to the way in which elements are situated within groups in the periodic table:

- elements with the same number of electrons in the outer shell are in the same group of the periodic table

B1.35 The correct names for sub-atomic particles and their position in an atom – protons, electrons and neutrons:

- protons – found in the nucleus
- neutrons – found in the nucleus
- electrons – found in orbitals around the nucleus

Acids/bases and chemical change

B1.36 The physical and chemical properties of acids:

What you need to teach

- irritant or corrosive
- neutralise bases
- react with metals to form H_2
- pH less than 7

B1.37 The concept of strong and weak acids (as distinct from dilute and concentrated solutions):

- strong acids are completely dissociated in aqueous solution (for example, sulfuric, hydrochloric and nitric acids)
- weak acids are only partially dissociated in aqueous solution (for example, ethanoic and carbonic)
- for a given concentration of aqueous solution, the stronger the acid, the lower the pH
- as the pH of an acid decreases by one unit, the hydrogen ion concentration of the solution increases by a factor of 10

B1.38 How to determine the name of the salt produced in the following acid-base reactions:

- acid + base → salt + water (for example, HCl + NaOH → NaCl+$H_2$0)

Rates of reaction and energy changes

B1.39 The principles of collision theory, including:

- molecules must collide
- molecules must collide with enough energy to break and reform bonds (activation energy)
- molecules must be in the correct spatial orientation

B1.40 The effect of temperature on rates of reaction:

- an increase in temperature makes molecules move faster, resulting in increased collisions and rates of reaction
- lower temperatures result in decreased collisions and rates of reaction

B1.41 The definition of a catalyst and the role of catalysts in a reaction:

- catalysts are substances that increase the rate of a chemical reaction without themselves being permanently chemically changed
- principles of reaction kinetics Maxwell-Boltzmann distribution curve

Chemical analysis of substances

B1.42 The principles of the following tests and techniques used to separate substances in order to detect or identify chemical composition:

- thin layer chromatography:
  - used to separate non-volatile mixtures based on their affinity for a mobile (solvent) or stationary phase (on a coated plate)
  - used to detect the number of components
  - used to identify the compounds and their purity
- column chromatography:
  - used to separate a single chemical compound from a mixture (in a vertical column)

What you need to teach

- gas chromatography:
  - used to separate and analyse compounds that can be vaporised (in a packed column)
- high performance liquid chromatography:
  - used to separate substances based on their affinity for a mobile (pressurised solvent) or stationary phase (in a capillary or packed column)
- mass spectrometry:
  - used to separate substances due to their mass to charge ratio and to identify molecular ions and ion fragments
  - used to identify the components of an unknown sample due to their molecular weights

B1.43 The tests that could be used to quantify components in a mixture:

- gas chromatography
- high performance liquid chromatography
- mass spectrometry

B1.44 The principle of titration:

- determining the volumes of acids and alkalis required for neutralisation to occur

Electricity

B1.45 The definitions of, and how to calculate, charge and current using Q=It

B1.46 The definitions of, and how to calculate, current, potential difference and resistance, using Ohm's law V=IR

B1.47 How to calculate total resistance of multiple fixed resistors in a series and parallel circuit:

- series: the total resistance is equal to the sum of the individual resistors
- parallel: $\frac{1}{R} = \frac{1}{R1} + \frac{1}{R2} + \frac{1}{Rn}$

B1.48 The difference between alternating and direct current

B1.49 The properties of mains electricity in the United Kingdom:

- alternating current
- potential difference ensures electricity is supplied to residences and businesses at 230 volts
- generated at a frequency of 50Hz

Magnetism and electromagnetism

B1.50 Magnetism and magnetic poles:

- north and south magnetic poles are where the magnetic forces are strongest
- attraction/repulsion of magnets in close proximity (attraction and repulsion between magnetic poles are examples of non-contact forces)
- the difference between permanent and induced magnets
- the uses of permanent and temporary magnetic materials (for example, iron, steel, cobalt, nickel)

B1.51 Magnetic fields:

What you need to teach

- the shape and direction of the magnetic field around bar magnets, and the relationship between the strength of the field and concentration of field lines
- how a magnetic field is produced by the flow of current through conducting wire, including the relationship between:
  - strength of the field
  - size of the current
  - distance from the wire

B1.52 The uses of electromagnetism and electromagnets:

- portative and tractive electromagnets
- principles of electromagnetic induction – the production of voltage
- principles of the motor effect – causing movement in a motor
- applications of electromagnets in electric and electromechanical devices (for example, transformers, induction heating, MRI machines)

Waves

B1.53 The definition of a wave:

- the transfer of energy, not matter

B1.54 The relationship between frequency, wavelength and speed using the wave equation $v=f\lambda$

B1.55 The properties of longitudinal and transverse waves:

- longitudinal waves move in the same direction in which the particles are vibrating
- transverse waves move in a direction at right angles to the way in which the particles are vibrating

B1.56 The uses of different types of waves:

- communication (for example, radio waves)
- medical uses (for example, X-rays for imaging, gamma rays for cancer treatment and sterilisation, ultrasound in scanning and cleaning laboratory equipment)
- food processing (for example, infrared heating and microwave heating)

Particles and radiation

B1.57 The types and properties of ionising radiation:

- alpha:
  - high ionising but low penetrating power
  - range is 1 to 2 centimetres of air
- beta:
  - medium ionising and penetrating power
  - range is approximately 15 centimetres of air
- gamma:
  - low ionising and high penetrating power
  - range is many kilometres of air

What you need to teach

B1.58 The definitions of half-life and count-rate:

- half-life: the time taken for half the unstable nuclei in a sample to decay
- count-rate: the number of decays recorded each second

B1.59 The main types of radioactive decay in relation to unstable nuclei:

- an alpha particle: consists of 2 neutrons and 2 protons and is equivalent to a helium nucleus
- a beta particle: a high-speed electron ejected from the nucleus as a neutron turns into a proton
- a gamma ray: electromagnetic radiation from the nucleus

B1.60 How radiation interacts with matter:

- ionisation: by causing electrons to break apart from atoms or molecules
- excitation: by transferring energy to atoms or molecules

B1.61 The applications of radioactivity within the health and science sector:

- radioactive tracers
- medical diagnostic applications
- food preservation
- dating deceased organisms

Units

B1.62 The use of the International System of Units (SI):

- ampere (A) – electric current
- candela (cd) – luminous intensity
- kelvin (K) – temperature
- kilogram (kg) – mass
- metre (m) – length
- mole (mol) – amount of substance
- second (s) – time

B1.63 How to convert between units:

- millimetres to metres
- milligrams to grams
- millilitres to litre

B1.64 The importance of using significant figures and science notation:

- makes calculations with large or small numbers less cumbersome
- reduces the chances of data errors

B2: Further science concepts

What you need to teach

The student must understand:

B2.1 The components of the endocrine system; where they are located, their function and structure, including how they are organised:

- components of the endocrine system and how they are organised:
  - hypothalamus
  - pituitary
  - thyroid
  - parathyroid
  - adrenals
  - ovaries
  - testes
  - pancreas
- functions of the endocrine system:
  - the production and activity of specific hormones:
    - thyroxine
    - cortisone
    - adrenaline
    - oestrogen
    - testosterone
    - gastrin
    - growth hormone
    - follicle-stimulating hormone (FSH)
  - the specificity of hormones in relation to target cells/organs
  - the role of the pancreas in the regulation of blood glucose, including the production of insulin and glucagon
  - the action of antidiuretic hormone (ADH) in urine production
  - digestion
  - growth
  - effects of adrenalin

B2.2 The components of the respiratory system; where they are located, their function and structure, including how they are organised:

- components of the respiratory system and how they are organised:
  - lungs
  - trachea
  - bronchi

What you need to teach

- bronchioles
- alveoli and pleural membranes
- ribs, intercostal muscles and diaphragm

- functions of the respiratory system:
  - how gaseous exchange occurs by the process of ventilation (inspiration and expiration), including the role of the intercostal muscles
  - the role of ciliated epithelial tissue and pulmonary surfactant
  - how and where gaseous exchange takes place
  - how breathing rate can be increased or decreased
  - nasal turbinates and sinuses
  - nasal passage
  - oropharyngeal passage
  - epiglottis
  - mucociliary transport

B2.3 The components of the nervous system; where they are located, their function and structure, including how they are organised:

- components of the nervous system and how they are organised:
  - central nervous system (CNS)
  - peripheral nervous system (PNS), including the structure of a mammalian motor neurone (dendrites, cell body, nucleus, axon, myelin sheath of Schwann cells, Nodes of Ranvier, axon endings/terminals and synaptic ends)
- functions of the nervous system:
  - the role of the PNS in carrying messages via sensory neurones to the CNS
  - the role of the PNS in reflex actions
  - the role of the CNS in processing and conveying messages via motor neurones to effector organs
  - the role of the different components of a motor neurone, and the process of synaptic transmission
  - different sensors in the body:
    - pressure
    - temperature
    - sound
    - light
    - touch
    - pain
    - taste

B2.4 The components of the musculoskeletal system; where they are located, their function and structure, including how they are organised:

- components of the musculoskeletal system and how they are organised:
  - main types of bones and joints

What you need to teach

- general structure of striated muscle

- functions of the musculoskeletal system:
  - role of the skeletal system in providing support, protection, attachment for muscles/ligaments, a source of blood production and a store for minerals
  - role of muscular system in movement (locomotion) and support
  - the sliding filament theory of musculoskeletal function in terms of thick and thin filaments sliding over one another to bring about contraction and relaxation
  - muscles functioning as antagonist pairs

B2.5 The components of the digestive system; where they are located, their function and structure, including how they are organised:

- components of the digestive system and how they are organised:
  - mouth
  - oesophagus
  - stomach
  - pancreas
  - liver
  - duodenum, ileum and colon, including layers of the gastrointestinal tract
  - associated glands linked to these components, including salivary glands in the mouth, mucus and acid glands in the stomach, mucus glands in the intestines, gall bladder and bile duct
- functions of the digestive system:
  - breakdown of food by chemical and mechanical digestion
  - absorption processes
  - role of enzymes in digestive process, including salivary amylase, pancreatic amylase, lactase and sucrase, proteases and lipases
  - the role of microorganisms in digestion
  - the major products of digestion

B2.6 The components of the cardiovascular system; where they are located, their function and structure, including how they are organised:

- components of the cardiovascular system and how they are organised:
  - arteries
  - capillaries
  - venules and veins
  - mammalian heart, including tricuspid, bicuspid and semi lunar valves
  - blood made up of plasma, platelets, red blood cells and white blood cells, including the terms thrombocyte, erythrocyte and leucocyte
- functions of the cardiovascular system:
  - facilitates the circulation of blood to transport nutrients, oxygen, waste products (for example, carbon dioxide and components of urine), hormones and blood cells
  - cardiac cycle, including pressure changes in the heart and blood vessels and how this is linked to

What you need to teach

blood pressure

- electrical activity of the heart (for example, PQRST waves) and how heart rate is controlled and regulated
- blood groups, ABO and Rh

B2.7 The components of the reproductive system in males and females; where they are located, their function and structure, including how they are organised:

- components of the female reproductive system and how they are organised:
  - females:
    - ovaries
    - fallopian tube
    - uterus
    - cervix
    - womb
    - vagina
- components of the male reproductive system and how they are organised:
  - males:
    - penis
    - urethra
    - scrotum
    - testes
    - vas deferens
    - seminar vesicles
    - prostate
- functions of the reproductive system:
  - overall: provides a mechanism for the survival of the species by producing offspring through the combination of eggs and sperm
  - female reproductive system has 2 functions – to produce egg cells and to protect and nourish an offspring until birth
  - male reproductive system has one function – to produce and deposit sperm
  - stages of embryofoetal development (fertilisation to growth in third trimester)

B2.8 The components of the renal system; where they are located, their function and structure, including how they are organised:

- components of the renal system and how it is organised:
  - kidney
  - glomerulus
  - nephron
  - ureter
  - bladder

What you need to teach

- urethra
- functions of the renal system:
  - removal of waste products from the body
  - process of urine production
  - production of hormones
  - role in osmoregulation
  - role in homeostasis (for example, hydration)

B2.9 The components of the integumentary system; where they are located, their function and structure, including how they are organised:

- components of the integumentary system and how they are organised:
  - skin
  - hair
  - nails
  - exocrine glands
- functions of the integumentary system:
  - temperature regulation
  - vitamin D synthesis
  - protection/barrier
  - cutaneous sensation
  - excretion

B2.10 The basic function of the eye and visual system, including:

- lids
- cornea
- iris
- lens
- retina
- optic nerve
- visual cortex

B2.11 The use of physiological measurement tools and techniques in monitoring the action of physiological systems:

- cardiovascular system:
  - electrocardiogram (ECG):
    - used to measure the electrical activity of the heart
  - sphygmomanometer:
    - used for the measurement of blood pressure as an indication of cardiovascular blood flow
  - stopwatch/clock:

What you need to teach

        - manually measure heart rate through taking the pulse
    - respiratory system:
        - spirometry:
            - used to measure the volume and flow of air expelled after taking a maximum breath in
        - peak expiratory flow meter:
            - used to measure a person's maximum speed of expiration, as related to the airflow through the bronchi and any possible obstructions
        - pulse oximetry:
            - used for measuring oxygen saturation of the blood
    - endocrine system:
        - glucose meter:
            - used to measure blood sugar levels
        - insulin
        - dipstick:
            - used for urine measurements
    - body temperature:
        - infection/fever
        - blood flow
    - pupil dilation and constriction:
        - general observation can indicate underlying issues (to be referred)

B2.12 The normal expected ranges for physiological measurements and how to identify when physiological measurements fall outside the normal expected ranges, including factors that can contribute to measurement outside of usual parameters:

- normal expected ranges for physiological measurements:
    - blood pressure: systolic and diastolic

	Systolic mm/hg	**Diastolic mm/hg**
low blood pressure (hypotension)	< 90	< 60
normal blood pressure	90 to 120	60 to 80
pre-high blood pressure	120 to 139	80 to 89
high blood pressure (hypertension)	≥ 140	≥ 90

    - heart rate:
        - normal resting rate of between 60 to 100 beats per minute (bpm) for adults

What you need to teach

- peak expiratory flow:
  - between 400 and 700 litres per minute for adults
- blood sugar:
  - 4.0 to 5.9 mmol/L (before a meal) to under 7.8 mmol/L (after a meal) for adults

- how to identify abnormal physiological measurements:
  - any measurements that fall outside of the normal range
  - ECG waves missing or look unusual
- factors that contribute to measurements outside of normal parameters:
  - age
  - smoking
  - exercise
  - sex
  - height
  - weight
  - stress
  - type 1 and type 2 diabetes

B2.13 The principles of homeostasis and how this links to maintaining the functions within the physiological systems and contributes to preserving a healthy body:

- principles of homeostasis:
  - receptors
  - effectors
  - feedback systems
  - role of nervous system
  - role of the endocrine system
- maintains stability and function of the physiological systems and cells when there are changes to internal and external conditions that would otherwise prevent normal physiological function:
  - contributes to the maintenance of a healthy body

B2.14 How failure of homeostasis mechanisms can impact the body and the subsequent development of disorders:

- failure of homeostasis mechanisms:
  - cells work incorrectly resulting in possible toxicity or deficiency
- disorders:
  - type 1 and type 2 diabetes
  - heat stroke or hyperthermia
  - renal failure
  - Graves' disease

What you need to teach

- infection/sepsis
- dehydration
- nervous system disorders (for example, tremors or convulsions)

B2.15 Different classification systems and their purpose:

- classification systems:
  - topographic: by bodily region (for example, cardiovascular)
  - anatomic by organ or tissue (for example, heart)
  - physiological by function of affect (for example, angina)
- purpose:
  - provides a common language for reporting and monitoring
  - allows the sharing and comparing of data
  - allows rates and frequency of disease to be assessed
  - supports the development of possible treatment

B2.16 Specific diseases and disorders and their relationship to the classification systems, including the possible causes and symptoms:

- diseases and disorders, including causes and their symptoms:
  - diverticulitis is a gastrointestinal disease in the topographical classification:
    - symptoms include lower abdominal pain of sudden onset, but can be prolonged
    - cause is inflammation of abnormal pouches (diverticula) which develop in the wall of the large intestine
    - any blood biomarkers
  - hepatitis is a liver disease in the anatomical classification:
    - symptoms include inflammation of the liver and possibly fatigue, dark urine, pale stools, loss of appetite and unexplained weight loss
    - causes include viral infection, paracetamol overdose and liver damage, possibly linked to excess alcohol intake
  - chronic obstructive pulmonary disease (COPD) affects oxygen exchange and is classed as a physiological disease:
    - symptoms include shortness of breath, wheezing, chest tightness and chronic cough
    - cause is respiratory system damage, specifically obstruction of airways, such as collapse of airways (emphysema) and inflammation and narrowing of airways (chronic bronchitis); such damage is often a result of smoking or chronic/severe asthma

B2.17 Injury and trauma and the various ways in which the body reacts systemically as a response:

- injury is defined as damage to the body caused by external force:
  - involuntary inflammatory response:
    - increased blood flow to the area
    - increased metabolic rate
    - redness

What you need to teach

        - pain
        - swelling
        - white cell response
        - antibody response
        - pus formation and exudation
    - proliferation phase:
        - growth of new tissue which replaces old tissue
        - soft tissue repair
        - early stages contract wound, scab formation (if on skin) and create scar tissue
        - the wound is then remodelled to increase tensile strength
        - maturation stage then begins to fade the scar and increase tensile strength
- trauma is defined as an injury that has the potential to cause disability or death:
    - involuntary inflammatory response:
        - increased blood flow
        - increased metabolic rate
        - redness
        - pain
        - swelling
        - white cell response
        - antibody response
        - pus formation and exudation
    - loss of organ function
    - haemorrhaging:
        - bleeding
        - skin bruising
    - single or multi-organ failure
    - ischemia:
        - known as ‘going into shock’
        - can be caused by a reduced amount of oxygen entering the body (hypoperfusion)
        - can be caused by low blood pressure or bleeding
    - proliferation phase:
        - growth of new tissue which replaces old tissue
        - soft tissue repair
        - early stages contract wound and create scar tissue
        - the wound is then remodelled to increase tensile strength
        - maturation stage then begins to fade the scar and increase tensile strength

B2.18 What is meant by epidemiology and how its objectives provide information to plan and evaluate

What you need to teach

strategies to prevent illness, including how this has contributed to the prevention of the spread of specific diseases:

- the meaning of epidemiology:
  - study and analysis of the distribution and patterns of disease in populations and why they occur
  - influencing factors (for example, diet, environment, ethnicity, age, sex, co-medications, recreational drugs)
- how objectives and strategies prevent illness:
  - identify the cause of disease
  - determine the extent of disease
  - identify trends and patterns of the incident and frequency of the disease
  - study the progression of disease
  - plan and evaluate preventive and therapeutic measures for a disease or condition
  - develop public health policy and preventative measures
- specific diseases:
  - coronaviruses (for example, Covid-19, severe acute respiratory syndrome, Middle East respiratory syndrome):
    - education about preventative measures
  - human immunodeficiency virus (HIV):
    - biomedical interventions
    - education about preventative measures

B2.19 How health promotion helps to prevent the spread and control of disease and disorders:

- communication:
  - raising awareness of required behaviours through a range of media:
    - social media
    - leaflets
    - television
    - radio
- policy and systems:
  - systematic change to procedures, regulations or law to enforce required behaviour:
    - restricted access
    - closure
    - restricted movement of people
    - test and trace
- education programmes:
  - improving knowledge and empowering individuals to adapt own behaviour (for example, e-learning)
- active vaccination and/or therapy programmes (where possible) and active vaccine/therapy research

B2.20 The concepts of genome and genomics and why these are different to the concept of genetics:

What you need to teach

- genome:
  - a genome is the complete set of genetic information for an organism, including the coding (genes) and non-coding DNA stored within a cell
- genomics:
  - the study of the structure and function of an organism's genome (all of its DNA). This field of study includes DNA sequencing methods, and bioinformatics to sequence, assemble and analyse the structure and function of genomes
- genetics:
  - study of individual genes and their role in inheritance

B2.21 The characteristics of the different study areas within genomics:

- structural genomics:
  - study and description of the 3-dimensional structure of every protein encoded by a specific genome
- functional genomics:
  - study of the functions and interactions of all the genes (and therefore the proteins) in a cell – it focuses on dynamic aspects such as transcription, translation, gene expression and protein interactions
- evolutionary genomics:
  - study of the changes that may occur in a genome over an evolutionary timescale
- epigenetics:
  - study of DNA modifications which do not change the DNA sequence but can affect gene activity

B2.22 How techniques in genomics are used to investigate, diagnose and treat disorders:

- gene sequencing:
  - used to detect the order of bases (the codons) on the DNA within a genome, which corresponds to proteins that will be produced
  - this will identify if a particular cell is unable to produce a specific protein for physiological function, such as an enzyme needed by the body in a metabolic reaction
- genome mapping:
  - used to identify and record the location of genes on a chromosome and distance between genes
  - this will identify any specific chromosome abnormalities
- genome editing:
  - used to change the DNA within a cell, by adding or removing DNA sections or altering the DNA sequence
  - this can enable a genome to produce proteins it was not previously able to make, or affect the non-coding sections to switch on/off gene expression and protein production

B2.23 The applications of genomics within healthcare science:

- prenatal tests during pregnancy:
  - screen for specific genetic disorders due to family history or other factors
- screening of individuals as a result of family history:
  - screen for inherited disorders that are the result of gene variants or mutations

What you need to teach

- personalised/targeted cancer treatment:
  - the use of targeted drug therapies based on the specific mutations in an individual's cancer
- pharmacogenomics:
  - the prescription and dosage of medication based on genetic profile to avoid adverse drug reactions or prescription of drugs that may not be affected
- assessing predisposition to illness or disease:
  - screening of the whole genome can identify the susceptibility of a person to certain disorders such as heart disease, stroke or cancer

B2.24 The importance of bioinformatics within the area of genomics:

- brings together multiple disciplines to understand biological data – disciplines include:
  - biology
  - computer sciences
  - mathematics/statistics
- used to organise, analyse and understand biological data sets to make the data understandable and clinically actionable
- role in developing software solutions for analysis of biological data:
  - work with 'big data':
    - use larger data sets for more accurate results (for example, genome-wide association studies, 100,000 Genomes Project)
  - automation of analysis processes:
    - faster analysis
    - fewer manual tasks involved
- can be used for prediction modelling

B2.25 How physics principles are applied in the field of medical physics to support prevention, diagnosis and treatment of disease:

- physics principles and their application:
  - electric potentials used to measure heart electrical activity in electrocardiogram (ECGs)
  - transducer used to produce and receive sound waves to create a sonogram in an ultrasound scan
  - a magnetic field and radio-waves are used to generate images in magnetic resonance imaging (MRI)
  - ionising (electromagnetic) radiation is the basis for X-ray imaging, with this radiation passing through the body to generate images
  - use of radiotherapy to treat some cancers

Core skills

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

Glossary

Patient

An individual who is ill or is receiving medical treatment for a disease or underlying condition from a doctor or hospital. The patient will be registered with a particular doctor, such as a general practitioner (GP) or medical consultant.

Service user

The healthcare science sector offers a wide range of clinical and diagnostic healthcare services. A service user can denote a variety of individuals who may access these services, including patients, medical clinicians, NHS Trust providers, GP surgeries, commissioners, community practitioners and referral centres and private/independent companies.

Customer

An individual who purchases goods or services within the healthcare science sector.

CS1: Research skills

The student must be able to research from independently identified sources of information, including being able to conduct literature searches to contribute to research and innovation within a specific area of practice.

What you need to teach

The student must be able to:
CS1.1 Collect literature and introduce the scope of the review and the criteria for the selection of sources:
• define the topic and scope of the research to be undertaken:
  ○ define topic/problem being investigated
• identify relevant literature (for example, journals, databases, research documents and case studies):
  ○ identify what was included in the review
  ○ identify what was not included in the review and why it was not included
• validate sources by investigating:
  ○ source and author bias

What you need to teach

- age/relevance of source
- reliability of source
- source citations

CS1.2 For each of the selected literature, identify and record through analysis:

- what was the research question of the literature?
- what were the research methodologies?
  - analyse the literature review undertaken by the source, the samples and variables used, the results, and the conclusions
- if there is conflicting literature, why do you think that is?
- how are the authors viewed in the field? Has this literature been cited? If so, how has it been analysed?

CS1.3 Undertake a logically ordered discussion of themes, including how the literature relates to one another and to the specific research or innovation in an area of healthcare science practice:

- summarise key findings, using appropriate technical terms
- highlight agreements and disagreements in the findings
- organise material coherently to suit the length and purpose of the review
- identify any gaps or potential future areas of study
- identify changes that could be made to improve the research undertaken
- utilise findings to contribute to research and innovation within a specific area of practice

(GEC2, GEC3, GEC4, GEC5)

CS2: Communication skills

Communicate effectively with patients, customers, carers and other health and social care professionals using a range of techniques to overcome communication barriers.

What you need to teach

The student must be able to:

CS2.1 Communicate clearly and effectively with a variety of stakeholders, including:

- patients
- service users
- customers
- carers
- other health and social care professionals

CS2.2 Communicate effectively with a variety of stakeholders within the healthcare science setting:

What you need to teach

- communicate in a clear and unambiguous way, tailoring language and technical information to the audience
- select the most appropriate way of communicating, using images and other tools (for example, visualisations or infographics) to clarify complex information
- ask appropriate questions to test understanding based on the task required:
  - open
  - closed
  - leading
  - probing
- actively and/or critically listen to the stakeholder's contributions
- respond to the stakeholder's questions, using a tone and register that reflects the audience
- speak clearly and confidently, using appropriate tone and register
- display appropriate body language (for example, engaged, open)
- communicate benefits to stakeholders, using calculations, diagrams and data to reinforce these assertions

CS2.3 Use a range of techniques to overcome communication barriers:

- succinctness
- avoid use of jargon/slang (for example, use non-clinical terminology)
- retain awareness of cultural differences
- use of assistive technology and other communication aids where appropriate (for example, braille)
- collaborative working with other professionals (for example, carers)
- identify when to refer to a colleague (for example, if sign language or translation services are required)
- use nonverbal communication such as gestures to imitate actions (for example, eating or drinking)
- use a quiet space free from distractions

(GEC1, GEC2, GEC3, GEC6, GMC8, GDC2)

CS3: Team working skills

Work collaboratively with a range of healthcare professionals within and outside a specific team, as well as with other individuals such as carers.

What you need to teach

The student must be able to:

CS3.1 Identify the functions of different teams/job roles as well as their own role within the wider team/working context:

- stakeholder groups to include:

What you need to teach

- other healthcare science professionals
- professionals in other sectors
- patients/carers

- identify structure of the team:
  - position within the team
  - identify any direct reports
  - identify relevant departmental organigrams
  - define team responsibilities and accountabilities
- identify scope of practice of collaborators (for example, patients/carers):
  - identify how scope of practice impacts on activities undertaken by different teams:
    - own scope of practice
    - collaborators' scope of practice
- ask and respond to questions for clarification
- recognise increased importance of communication when dealing with stakeholders outside of the sector and adapt communication accordingly (for example, reduce technical language/jargon)
- identify own responsibilities:
  - tasks they are accountable for
  - position within wider healthcare organisation:
    - including task dependencies
  - deliverables they are accountable for
  - direct reports (if applicable)

CS3.2 Undertake collaborative working, demonstrating an ability to:

- establish a common purpose or goal
- demonstrate respect towards others
- delegate work when appropriate
- encourage contributions from other participants
- demonstrate clear communication skills, including making relevant and constructive contributions to move discussion forward
- present information/ideas orally using non-digital and digital tools and other aids
- demonstrate adherence to relevant health and safety procedures
- follow standard operating procedures specific to the environment they are working in
- make decisions

(GEC2, GEC6)

CS4: Problem solving skills

Be able to identify problems, propose innovative solutions, implement these solutions and, where appropriate, make use of new technologies to solve problems.

What you need to teach

The student must be able to:

CS4.1 Identify a problem and conduct a typical root cause analysis:

- define:
  - properly define the problem
  - properly define the changes required
- measure:
  - establish measurability and feedback tools to monitor any change
- analyse:
  - monitor affected individuals or teams and assess against defined measurement tools
- improve:
  - identify further improvements that can be made following implementation, including the use of new technologies
- control:
  - establish how change can be embedded into general working (for example, training plan requirements, performance measuring criteria)

CS4.2 Plan how to implement and embed the identified solution:

- define the strategy for implementing the change:
  - what changes are required?
  - what steps are required to implement the changes?
  - what are the success criteria for measuring the success of the changes?
- define and document an implementation programme for the change to be embedded, including:
  - defining measures and feedback tools that will be used to measure the impact of the changes:
    - feedback surveys
    - departmental outputs
    - efficiency changes
  - defining control measures that will be required to embed the changes:
    - training plans and tools
    - performance management criteria
  - defining the success criteria by which the change will be assessed

(GEC2)

CS5: Reporting and presentation skills

Be able to interpret and analyse information and data to present conclusions in a range of formats to a variety of stakeholders.

What you need to teach

The student must be able to:

CS5.1 Interpret and analyse information and data:

- identify and collect suitable data
- process, interpret and apply data accurately as well as search for and gather evidence efficiently
- for the information and data collected, demonstrate an understanding of the:
  - nature
  - type
  - quality
  - reliability
- use appropriate technology to record and analyse data
- select and implement the correct data analysis technique for the task:
  - decide on approach
  - identify similarities and differences within information
  - identify relationships between information
  - combine different types of information:
    - qualitative
    - quantitative
- follow the correct policies and procedures to ensure confidentiality is adhered to
- share information as required in line with organisation's policies and procedures

CS5.2 Effectively present or report on conclusions following the analysis undertaken:

- use technical language correctly, using graphics and other tools to aid understanding
- demonstrate understanding of audience requirements
- ensure data is presented in an appropriate manner (for example, appropriate graph selection)
- select appropriate font types, styles, sizes, colours and document layout
- use appropriate communication skills to present the data findings (for example, verbal communication, written report, escalation via an online system):
  - utilise different technologies when appropriate
- summarise key information, using appropriate technical terms:
  - highlight agreements and disagreements in the data
  - identify any gaps or potential future areas of study
- manage time effectively to ensure all relevant points are covered:
  - prioritise information to communicate within the discussion

What you need to teach

• demonstrate knowledge via questioning and answers:
  ○ allow time for Q&A activities
  ○ consider responses to questions that you may be asked:
  ▪ review appropriate materials to inform responses
• for written communications: demonstrate correct referencing throughout, a full bibliography, and using a recognised referencing system (for example, Harvard or Vancouver)
(GEC1, GEC6, GMC5, GDC4, GDC5)

CS6: Reflective evaluation

Be able to reflect on own practice and make improvements to own practice, for example, having completed a task, reviewing and suggesting improvements and consideration of lessons learnt for own professional development.

What you need to teach

The student must be able to:
CS6.1 Select the appropriate evaluation theory to use when reflecting on the task:
• Kolb:
  ○ primarily used when reflecting on laboratory-based activities
  ○ the 4 stages of the experimental learning cycle
• Gibbs:
  ○ primarily used when reflecting on patient facing activities
  ○ 6 stage reflective cycle
CS6.2 Carry out appropriate evaluations of own practice within the task:
• describe:
  ○ describe the situation or experience
• feelings:
  ○ describe thoughts and feelings during the task
• evaluate:
  ○ summarise good and bad elements of the experience
  ○ record individual actions taken within the task:
  ▪ the contribution of actions to overall result
  ▪ thought/emotions when completing actions
• analyse:
  ○ what might have helped and hindered the experience (for example, unclear instructions)
  ○ use of relevant research and literature to aid analysis of the task
  ○ assess suitability of methods/techniques used

What you need to teach

- conclude:
  - what could be improved for future tasks?
- action plan:
  - summation of all previous elements of the cycle
  - identification of improvements:
    - actions they would repeat in future
    - areas in which they require development
    - actions they would perform differently in the future
- evaluate fulfilment of objectives

CS6.3 Use reflective evaluation to identify:

- improvements that can be made to own performance within the task
- improvements that can be made to team performance within the task
- alternative approaches that could have been taken:
  - as an individual
  - as a team
- appreciation of own knowledge limitations (for example, when to seek help)

(GEC6)

Occupational specialism – Optical Care Services

Knowledge and skills are set out side-by-side within their themed sections. The numbering is sequential throughout the performance outcome, from the first knowledge statement, following on through the skills statements. The 'K' and 'S' indicate whether the statement belongs to knowledge or skills.

Mandatory content

Performance outcome 1: Provide optical care and advice including prescription interpretation, screening and dispensing to contribute to patient health and wellbeing

Performance outcome 2: Provide spectacle collection, adjustments and repair services

Performance outcome 3: Undertake retail activities to provide walk-in customers with a range of products and optical services

Glossary

Multifocal

In this specification, where the term 'multifocal' is used, this refers to varifocal and occupational lenses.

Restricted category

Patients for whom one or more of the following is true:

- is under 16
- is registered as sight impaired (SI) or severely sight impaired (SSI)

Sight impaired (SI)

The Royal National Institute of Blind People (RNIB) defines an individual who is SI as falling into one of the following categories, while wearing any required spectacles or contact lenses:

- visual acuity of 3 / 60 to 6 / 60 with a full field of vision
- visual acuity of up to 6 / 24 with a moderate reduction of field of vision or with a central part of vision that is cloudy or blurry
- visual acuity of 6 / 18 or even better if a large part of your field of vision (for example, a whole half of your vision is missing, or a lot of your peripheral vision is missing)

Severely sight impaired (SSI)

The RNIB defines an individual who is SSI as falling into one of the following categories while wearing any required spectacles or contact lenses:

- visual acuity of less than 3 / 60 with a full visual field
- visual acuity between 3 / 60 and 6 / 60 with a severe reduction of field of vision, such as tunnel vision
- visual acuity of 6 / 60 or above but with a very reduced field of vision, especially if a lot of sight is missing in the lower part of the field

Performance outcome 1: Provide optical care and advice including prescription interpretation, screening and dispensing to contribute to patient health and wellbeing

Roles and responsibilities of an optical assistant	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K1.1 The roles and responsibilities of the different members that make up the wider optical team:** • dispensing optician (DO) (or trainee DO under supervision): o working in accordance with the General Optical Council (GOC) standards o may be a member of a professional body (for example, Association of British Dispensing Opticians (ABDO), The Federation of (Ophthalmic and Dispensing) Opticians (FODO)) o preparing and dispensing optical prescriptions, including for under-16s and those who are sight impaired (SI) or severely sighted impaired (SSI) o issuing and amending prescriptions o verifying frame suitability for under-16 dispenses o supervising collections of under-16 spectacles o fitting and supplying ocular appliances o solving issues with frames/lenses before recheck takes place o adjusting and repairing frames o dispensing restricted prescriptions (for example, low vision aids) o supervising the dispensing of more complicated prescriptions (for example, + or -10) o checking glazed spectacles in preparation for collection for restricted categories o supervising pre-registered DOs o safeguarding patients' general welfare o referring for specialist advice and emergencies	The student must be able to: **S1.71 Escalate tasks that fall outside of their own area of responsibility to the appropriate member of the optical team:** • dispensing and collection of restricted and complex prescriptions and ocular appliances: o optometrist o DO o CLO (where an optometrist or DO is unavailable) • issuing and amending prescriptions: o optometrist o DO o CLO (where an optometrist or DO is unavailable) • ocular emergencies: o enhanced services (for example, Minor Eye Conditions Services (MECs)) o optometrist o Hospital Eye Service (HES) • contact lens-related complications: o CLO o optometrist o hospital eye service • reported problem with vision or optical appliance: o DO o optometrist o CLO

Roles and responsibilities of an optical assistant	

• optometrist (or pre-registration optometrist under supervision):
  ○ working in accordance with the General Optical Council (GOC) standards
  ○ may be a member of a professional body (for example, the College of Optometrists, Association of Optometrists (AOP))
  ○ role may vary depending on additional qualifications/skills (for example, Independent Prescriber (IP), optometrist specialist in co-management of ocular conditions)
  ○ issuing and amending prescriptions
  ○ performing vision tests and analysing results
  ○ managing treatment of/treating minor eye conditions (MECs)
  ○ recognising the need to refer for specialist advice and emergencies and to assess the degree of urgency required in each instance
  ○ diagnosing ocular and systemic conditions
  ○ prescribing spectacles and contact lenses
  ○ supervising pre-registered DOs or optometrists
  ○ safeguarding patients' general welfare
• ophthalmologist:
  ○ an ophthalmologist is a medically qualified doctor who has undertaken further training to specialise in diagnosing, treating and monitoring complex eye conditions
  ○ registered member of the General Medical Council (GMC)
  ○ performing eye surgery
  ○ occasionally providing eye examinations under the title Ophthalmic Medical Practitioner (OMP)
  ○ safeguarding patients' general welfare
• orthoptists:
  ○ diagnosing and treating eye movement disorders and visual impairments related to the way eyes interact with the brain	

Roles and responsibilities of an optical assistant	
○ entitled to register with professional bodies (for example, British and Irish Orthoptic Society (BIOS)) ○ safeguarding patients' general welfare ○ assessing the development of vision in childhood if any anomalies are suspected up to the age of 7 years old ○ carrying out school screening of children in reception/age 4 in order to establish if any intervention is required to encourage or enable development of vision (for example, detecting amblyopia ('lazy' eyes) or strabismus ('squints')) • contact lens optician (CLO): ○ encompasses dispensing responsibilities (DO), with the addition of a contact lens qualification ○ working in accordance with the General Optical Council (GOC) standards ○ entitled to register with professional bodies (for example, The British Contact Lens Association (BCLA)) ○ issuing and amending prescriptions ○ assessing patients' suitability for contact lenses ○ fitting contact lenses ○ providing aftercare ○ safeguarding patients' general welfare ○ managing treatment of/treating minor eye conditions MECs ○ referring for specialist advice and emergencies • diabetic screener: ○ performing diabetic screening (for example, with a fundus camera) • optical laboratory technician: ○ accurately manufacturing lenses for spectacles in accordance with the prescription and the british standards ○ entitled to register with professional bodies (for example, The Worshipful Company of Spectacle Makers) ○ setting up frames according to a set of measurements or average values ○ cutting, grinding and polishing spectacle	

Roles and responsibilities of an optical assistant	
lenses, then fitting these lenses into frames ○ carrying out lens tinting or coating • practice manager/assistant manager: ○ complying with regulations and standards (for example, Equality Act, GOC standards) ○ cashing up tills ○ carrying out risk assessments and ensuring general compliance with health and safety regulations ○ recruitment/interviews ○ managing staff ○ diary management ○ dealing with escalated concerns/complaints ○ dealing with invoices ○ dealing with refunds ○ reordering stock ○ assigning staff roles and responsibilities ○ providing training and/or identifying training needs • ancillary: ○ enhanced services, with regional variations (for example, MECs) ○ sharing care of glaucoma, diabetic and macular degeneration patients **K1.2 The role and responsibilities of an optical assistant (in a delegated capacity):** • ensuring that all delegated duties are properly supervised by a qualified member of the optical team • complying with relevant legislation, regulations and relevant practice SOPs (for example, in relation to the Equality Act, UK GDPR) • providing care only when it does not pose a serious risk to themselves or others (for example, in domiciliary settings) • being a direct point of contact for patients (for example, greeting patients, booking appointments and follow-ups, showing care and compassion)	

Roles and responsibilities of an optical assistant	
• directing patients to alternative eyecare providers when appropriate (for example, urgent eyecare centres or accident and emergency) • maintaining patient records (for example, ensuring records are accurate, up to date and securely stored) • carrying out screening tests (for example, auto-refractor, visual field) • carrying out minor spectacle repairs and adjustments • supporting the registered optical professional (for example, repeating tests) • explaining the functionality and appearance of eyewear to patients • completing the dispensing process, including assisting patients with frame and lens choices, and taking facial measurements • ethically selling value-adding products (only selling products that genuinely will have value for the patient) • facilitating spectacle and contact lens collection (under supervision when facilitating collection by a patient from a restricted category) • measuring and adjusting frames • having an overview of different types of contact lenses and solutions • teaching patients how to handle and care for contact lenses • handling and maintaining stock • handling payments for purchases/services and use of the till • handling complaints and escalating them to a manager where appropriate • ensuring they are acting under the appropriate supervision (for example, when issuing contact lenses) • maintaining a safe, clean and hygienic environment, including maintaining infection control protocols **K1.3 The importance of continuous professional development (CPD) and self-**	

Roles and responsibilities of an optical assistant	
reflection/evaluation to support continuous improvement in an optical environment: • identifying current strengths and areas for development (for example, through feedback from colleagues and peers) • setting personal and professional goals (for example, SMART goals) • maintaining up-to-date professional knowledge (for example, latest eyewear, advances in optical technology) • identifying opportunities for career progression (for example, DO qualification) • tracking professional experience and learning to identify any gaps • keeping up to date with: o changes in regulations o new technologies o new products, including those offered by other practices/manufacturers o pricing and offers	
K1.4 The optical activities that are outside an optical assistant's scope of practice and must be escalated to registered professionals for support and advice: • dispensing and collection of restricted or complex prescriptions and ocular appliances: o patients under 16 o patients who are SI or SSI o complex prescriptions (as described under NHS regulations) • ocular emergencies: o flashes and floaters o red eye o painful eye o sudden visual loss o sudden onset diplopia • checking glazed spectacles in preparation for collection by a patient from a restricted category	

Roles and responsibilities of an optical assistant	
• amendment of prescription • issuing contact lenses without supervision • contact lens-related complications (for example, red/painful eye, changes in vision loss, dry eye, solution sensitivity) • carrying out ongoing adjustments and repairs • providing clinical advice or results • giving opinions on screening results or clinical results • reported problems with vision or optical devices • third-party requests for a patient's records, without the patient's consent • subject access requests	

Health and safety regulations, legislation and standards in the optical environment	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K1.5 How health and safety at work legislation and regulations apply to the optical assistant role:** • ensuring retail displays are secure • following guidance for the use of visual display units (VDUs) • ensuring there are no obstructions (for example, boxes, wires) • being aware of hazards in the lab environment (for example, loose clothing near machinery) • ensuring contact lenses and solution are kept out of reach of children and vulnerable adults • ensuring repair tools and equipment are securely stored away • storing cleaning solutions in correctly labelled bottles (for example, acetone)	The student must be able to: **S1.72 Undertake and maintain safe working practices at all times:** • ensuring personal safety and hygiene: o not wearing loose clothing near machinery o ensuring loose or long hair is tied back, especially when using/near machinery o ensuring all surfaces are kept clean and antibacterial wipes are used where appropriate • moving and handling correctly: o assessing weight before attempting to pick up or carry objects o not picking up loads from the floor if possible o ensuring adequate space to prevent twisting or bending o ensuring a clear, level work area

Health and safety regulations, legislation and standards in the optical environment	

• adhering to fire regulations:
  ○ keeping fire evacuation routes clear
  ○ knowing the range of fire-fighting equipment available and when it can be used
  ○ knowing who the fire marshal is
  ○ knowing where the fire assembly point is
  ○ knowing the evacuation procedure
• logging of any “near misses” or accidents within the practice
• knowing who the first aider is
• only carrying out tasks for which they are trained (for example, moving and handling, first aid)
• correctly using equipment (only using equipment for which they have been trained)
• only using electrical equipment which has been portable appliance testing (PAT) tested
 	
K1.6 Control of Substances Hazardous to Health (COSHH) regulations in relation to the optical environment:
• a range of potentially hazardous substances:
  ○ eye drops
  ○ alcohol-based lens cleaning solutions
  ○ heated tint bath oil
  ○ acetone
  ○ disinfecting wipes
  ○ adhesives
  ○ cleaning products
• safe storage and disposal of potentially hazardous materials
 	
K1.7 The importance of adhering to Standard Operating Procedures (SOPs) and quality standards (including NHS standards) that apply to the optical assistant role:
• ensures the safe storage and disposal of
	○ not carrying double loads
	• recording and reporting accidents and near misses
	• applying correct posture when bending or sitting to use equipment
	• correctly using visual display units (VDUs)
	• safely using equipment:
	  ○ following manufacturer’s instructions
	• taking regular breaks
	• correct handling of clinical products:
	  ○ disposing of clinical products in the correct boxes
	  ○ rotating stock and checking expiry dates
	  ○ avoiding contaminating products through touch
	
	S1.73 Identify risks and hazards or dangers to self, patients or colleagues and act to minimise these:
	• step 1: identifying the hazards:
	  ○ slipping hazards (for example, wet floor after cleaning or spillage)
	  ○ tripping hazards (for example, frayed carpeting or uncovered cables)
	  ○ fire hazards (for example, build-up of flammable waste, such as paper and cardboard)
	  ○ electrical faults (for example, frayed electrical cables)
	  ○ repetitive strain injury (for example, through keyboard use)
	  ○ loose clothing (for example, a tie getting caught in machinery)
	• step 2: deciding who might be harmed and how:
	  ○ self
	  ○ patients
	  ○ colleagues
	  ○ visitors (for example, contractors)
	• step 3: evaluating the risks and deciding on precautions:

Health and safety regulations, legislation and standards in the optical environment	
clinical waste (for example, minims, fluorescein strips, tissues and wipes) • safeguards patients' confidentiality by complying with UK GDPR/data protection regulations (for example, by storing records correctly and gaining consent where required) • safeguards patients' and colleagues' safety (for example, through safe use and storage of equipment, understanding whistle-blower policies, and knowing who to take concerns to) • ensures the practice remains compliant with national guidelines (for example, not providing NHS eye tests sooner than the minimum intervals without cause) • ensures service consistency (for example, dealing fairly with complaints) • ensures safe and suitable optical products (for example, checking use-by dates on contact lens solutions) • safeguards against investigation/prosecution for breach of standards (for example, providing regulated services without supervision) **K1.8 Which organisations regulate the optical profession:** • the General Medical Council (GMC) regulates ophthalmologists • the General Optical Council (GOC) regulates optometrists, DOs, students and optical businesses • the Health and Care Professions Council (HCPC) regulates orthoptists **K1.9 The required standards of behaviour and performance set out in the GOC standards for:** • optical businesses • optometrists and DOs • optical students	○ slipping (for example, using a 'wet floor' sign) ○ tripping (for example, ensuring there are no obstructions such as boxes or wires) ○ fire hazards (for example, maintaining good levels of housekeeping) ○ electrical faults (for example, taking faulty electrical equipment out of service) ○ repetitive strain injury (for example, ensuring keyboard and mouse are in the correct position) ○ loose clothing (for example, ensuring that ties are secured behind an apron) • step 4: recording findings and implementing them, including completing risk assessment documentation • step 5: reviewing your assessment and updating if necessary **S1.74 Undertake procedures and processes for the reporting of accidents and emergencies:** • filling out the correct documentation for reporting an accident • report the accident • notify the first-aider or emergency services as appropriate **S1.75 Follow evacuation procedures:** • on hearing the alarm, calmly leaving the building immediately, without collecting personal belongings • signposting emergency exits and fire safety points to patients • seeking help from appropriate colleagues if required • proceeding to the fire safety point **S1.76 Demonstrate adherence with British and European standards and industry governance:** • checking that spectacles are correctly manufactured within tolerances of British Standards before collection (for example,

Health and safety regulations, legislation and standards in the optical environment

K1.10 A range of infection control procedures:

- use of optical-specific cleaning chemicals
  - alcohol-based (for example, hand gel):
    - cleaning hands
    - cleaning equipment
    - cleaning spectacle lenses
  - non-alcohol-based (for example, hydrogen peroxide, sodium hypochlorite):
    - disinfecting contact lenses
    - cleaning optical equipment (for example, that which comes into contact with patients)
    - cleaning surfaces
- body bio-spillage kit:
  - to reduce the risk of cross infection and contamination when cleaning bodily fluids in the optical environment
- appropriate disposal of clinical optical waste:
  - yellow: for disposal of non-hazardous pharmaceutical waste (for example, out-of-date minims and fluorets)
  - orange: disposal of infectious waste (for example, contaminated sharps)
  - yellow/black: for disposal of offensive, non-hazardous waste (for example, tonometer heads, used probes, large quantities of contact lenses)
  - purple: for hazardous waste (for example, chloramphenicol)

K1.11 Strategies for dealing with ocular emergencies:

- following relevant SOPs
- using triage forms, or online platform, to acquire relevant information, including symptoms, from patients to inform a course of action
- directing patients to the appropriate member of the optical team (for example, optometrist, DO) or hospital eye services

using an automated focimeter)

- carrying out internal quality checks during the inspection process
- ensuring that UK Conformity Assessed (UKCA) marking is present on all frames

S1.77 Undertake all optical care activities in accordance with relevant standard operating procedures, quality standards and systems

S1.78 Identify an ocular emergency:

- completing the triage form in conjunction with the patient, and recording symptoms in the correct place
- using the information in the triage form to determine next steps (for example, escalation to a senior colleague)
- acting within the scope of own responsibilities (for example, not attempting to diagnose a condition)

S1.79 Respond appropriately to ocular emergencies, within agreed pathways:

- making full notes of the signs and symptoms presented
- remaining calm
- following SOPs as appropriate
- recording any action recommended by senior colleague and who that was
- ensuring the triage form is accurately completed and stored in the appropriate place

S1.80 Escalate an ocular emergency:

- referring to the most suitable clinical practitioner (for example, optometrist, DO) in the appropriate timeframe
- summing up key points and communicating all relevant patient information to support the referral (GEC6)

Interaction and communication with customers	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K1.12 Procedures for establishing patient needs for Optical Care:** • greeting the patient • accessing records (if they are an existing patient) • establishing any prescription of existing eyewear (for example, using a focimeter, or accessing previous records) • asking appropriate questions to the determine patient's needs (for example, wheelchair access) • establishing the type of appointment required, which could include: o NHS or private eye examinations, with the option of scans (for example, Optical Coherence Tomography (OCT) or retinal photos) o contact lens after care o contact lens fitting o contact lens tuition on insertion and removal o sight test and contact lens aftercare combined o emergency appointments o spectacle dispensing/collection/adjustment/repair o specialist appointment (for example, for patients with autism or sensory needs, or children/vulnerable adults who must be accompanied) o recheck o diabetic screening o local enhanced services and pathways (for example, Minor Eye Conditions Service (MECs) and glaucoma refinement schemes) o additional healthcare services (for example, dry eye management, colorimetry, overlay assessment, hearing care appointment, public health tests)	The student must be able to: **S1.81 Use a range of suitable open and closed questions to identify patients' requirements for Optical Care:** • asking questions to check the patient's understanding: o open questions o closed questions o probing questions o tell, explain, describe (TED) • responding to the patient's questions or concerns regarding recommended products and/or services • confirming the outcome of the discussion and agreeing next steps (GEC1) **S1.82 Use a range of communication techniques when providing Optical Care services to build rapport and trust with the patient:** • using appropriate methods (for example, verbal, text or email) • adjusting vocabulary as appropriate (for example, avoiding technical language) • using written material (for example, in different languages) • keeping the patient informed and updated throughout • allowing time for the patient to process the information • using diagrams to support explanations • using augmented technology (GEC1, GDC3) **S1.83 Identify patient communication preferences in relation to their Optical Care:** • seeking consent from the patient (or parent/carer where necessary) in

Interaction and communication with customers	
○ dilation **K1.13 How to make recommendations for eyewear based on information obtained from patients, and knowing when to seek advice from colleagues:** • establishing the eyewear's primary purpose: ○ distance ○ near ○ both ○ intermediate ○ sunglasses ○ safety • establishing the patient's preferred budget • establishing preferred type of eyewear: ○ varifocals ○ single vision ○ bifocals ○ tinted and/or coated lenses ○ contact lenses ○ occupational lenses (for example, office lenses/enhanced readers) • establishing preferred frame style: ○ plastic ○ metal ○ rimless ○ traditional/contemporary ○ bold/discrete • seeking advice from colleagues: ○ for complex needs ○ for product availability (sourcing specialist products) ○ for a second opinion ○ for borderline fitting frames **K1.14 A range of potential barriers to communication when interacting with patients:**	accordance with UK GDPR requirements • establishing whether the patient agrees to contact in relation to their Optical Care • establishing how the patient would prefer to be contacted (for example, telephone call, SMS, email, post)

Interaction and communication with customers	
• language barrier (for example, a patient who does not speak English as a first language) • visual impairment (for example, may require more descriptive language when communicating) • use of complex jargon when communicating with a patient (for example, the patient may not understand an explanation of how a bifocal works) • patient is hard of hearing (for example, may rely on lip-reading) • different abilities (for example, patients who have had a stroke or those with autism, learning difficulties or speech/memory difficulties) • patient's age (for example, communicating directly with a child, or through parents/carers) **K1.15 The modifications that could be required to meet complex optical needs, where a standard frame is not sufficient:** • modified frame sizes to suit smaller or larger features (for example, hydrocephalus) • sports bands (for example, providing extra support to hold the frame in place) • spatula tips (for example, for those with ear disfigurements) • adjustable bridge and sides (for examples, for paediatrics)	

Anatomy, prescriptions and visual correction	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K1.16 The structure and function of all parts of the eye:** • eyelids/eye lashes: o protects the eyes from dust and other	The student must be able to: **S1.84 Explain the elements of a prescription in a patient-friendly way:** • using non-technical language (in person, over the telephone or through video

Anatomy, prescriptions and visual correction	
external debris • tear film: o keeps the eye moist and has a protective function • cornea: o helps to focus image onto the retina • conjunctiva: o provides a protective layer over the sclera • sclera: o part of the supporting wall/structure of the eyeball • aqueous humour: o supplies nourishment to the inner layers of the cornea and lens • iris: o controls how much light enters the eye • ciliary body: o changes the shape of the lens o allows the eye to change between distance and near focus o produces aqueous humour • crystalline lens: o focuses images onto the retina • vitreous humour: o supplies nourishment to the inner cells of the retina o a clear jelly that helps give the eyeball its spherical shape and allows transmission of light to the retina • retina: o reacts with the focused light to create electrical signals that it passes to the brain via the optic nerve • choroid: o supplies the outer layers of the retina with nutrients o helps to absorb light in order to avoid secondary images • macula: o has a very high concentration of	consultation) • using visual tools where appropriate (for example, leaflets, sample lenses, physical models) • referring a patient to online information • giving practical examples of how the prescription will benefit the patient's vision • checking the patient's understanding and prompting for any questions (GEC1) **S1.85 Explain to the patient how a prescription affects a finished product:** • using non-technical language and/or visual tools (for example, to describe the degree and location of any lens thickness) (GEC1) **S1.86 Advise and support patients when selecting appropriate frames and lens, including patients with specific visual needs or presbyopia:** • establishing the patient's needs: o function (for example, lifestyle, hobbies, working distances) o colour o appearance • assisting patient in selecting appropriate fit for their specific visual need: o ensuring the correct size of frame for their appropriate lens type and power • recommending the appropriate lens type for the patient's prescription, using non-technical language (for example, high index lenses or varifocals) • referring to a senior colleague where appropriate (for example, to confirm a recommendation) (GEC1) **S1.87 Transpose prescriptions:**

Anatomy, prescriptions and visual correction	
photoreceptor cells that detect light and send signals to the brain ○ the part of the retina that provides detailed and colour vision • optic nerve: ○ carries the signal from the retina to the visual processing part of the brain • extraocular muscles: ○ control directional movements of the eyes to ensure that both eyes are orientated towards the target of fixation **K1.17 How an optical prescription is written:** • sphere (SPH): the dioptric power of myopia, hypermetropia or presbyopia • cylinder (CYL): the amount of astigmatism in dioptres • axis: the angle at which the astigmatism lies • prism: the numerical amount of prism required in dioptres • base: the direction in which the base of any prism will face • visual acuity (VA): an indication of clarity of aided vision often measured by reading down a chart of progressively smaller targets from a set distance away • ADD (intermediate and-or near): the additional power that the patient needs in order to complete tasks at intermediate and near working distances • may include pupillary distance (PD) or centration distance (CD) • vertex distance (VD): the distance from the front side of the cornea to the back surface of the spectacle lens • vision: an indication of clarity of unaided vision often measured by reading down a chart of progressively smaller targets from a set distance away **K1.18 How an optical prescription is interpreted:** • which prescriptions relate to myopia (commonly referred to as short-	• add the SPH to the CYL • change the sign of the CYL • change the axis of the CYL by adding or subtracting 90 degrees • all CYLs must be between 1 and 180 degrees • prism and ADD must remain the same during transposition (GMC5) **S1.88 Recognise when there may be an error in the recording of a prescription and seek clarification/verification:** • sense-checking the prescription for errors or irregularities: ○ if there was no indication of whether the prescription is + or – ○ if one eye was + and one eye was – ○ unequal ADDs ○ absence of prism direction or power ○ prescription not signed or out of date ○ absence of VD measurement for prescriptions over a + or - 5.00D • seeking clarification/verification from a DO or optometrist where available (GDC4)

Anatomy, prescriptions and visual correction	
sightedness): ○ a negative number in the SPH box indicates that the patient is myopic ○ the larger the number, the greater the degree of refractive error • which prescriptions relate to hypermetropia (commonly referred to as long-sightedness): ○ a positive number in the SPH box indicates that the patient is hypermetropic ○ the larger the number, the greater the degree of refractive error • which prescriptions relate to astigmatism: ○ a positive or negative number in the CYL box indicates the amount of astigmatism ○ the number in the axis box refers to the angle, in degrees, at which the astigmatism is aligned ○ the larger the number in the CYL box, the greater the amount of astigmatism • which prescriptions relate to presbyopia: ○ the number in the ADD box indicates the amount of presbyopia ○ the reading ADD increases a plus prescription and decreases a minus prescription by its value (for example, -4.00 sphere with a +1 ADD becomes –3 sphere; a +4 lens with a +1 ADD becomes a +5 sphere) • which prescriptions relate to prism: ○ these will have values in the prism boxes, or show a triangle symbol next to them, with a base direction (up, down, in, out), which indicates in which direction the prism will act ○ can appear with any of the other prescriptions and should be referred to a colleague	
K1.19 The characteristics of positive and negative powered lenses, and their effects on vision and spectacle lens thickness: • positive/convex powered lenses magnify	

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the image: ○ are thicker in the middle than the edges when uncut ○ rays of light are bent by the lens so that they converge onto the retina ○ have a '+' sign written before the lens power in the prescription • negative/concave powered lenses minify the image: ○ are thicker at the edges than the centre when uncut ○ rays of light are bent so that they diverge before being converged onto the retina ○ have a '-' sign written before the lens power in the prescription • astigmatic lenses ○ the edge can thickness vary in different meridians	
K1.20 How a prescription relates to specific parts of the eye: • emmetropia: ○ distant objects sharply focused on the retina without any accommodative effort ○ does not require vision correction • myopia: ○ cornea and/or lens being too steep ○ the axial length of the eye being too long ○ distant objects will appear blurred and close objects will appear clear • hypermetropia: ○ cornea and/or lens being too flat ○ the axial length of the eye being too short ○ close objects can appear blurred and distant objects can appear clear ○ at low levels younger patients may have no symptoms or may experience clear but strained vision • astigmatism: ○ cornea and/or lens being curved	

Anatomy, prescriptions and visual correction	
differently in different meridians • presbyopia: o the crystalline lens becomes less flexible with age, impairing the ciliary body's ability to flex the lens and focus near objects onto the retina, which can result in blurred near vision and the need for reading spectacles • anisometropia: o a large difference in prescription between the eyes, caused either by significantly different axial lengths and/or corneal curvatures • prism: o used to help people whose eyes do not work perfectly together o can be used to treat diplopia	
K1.21 The lens manufacturing process: • plastic lenses are made from polymers which are either spun, moulded or ground into a prescription • glass lenses are moulded or ground into a prescription, a process usually referred to as 'surfacing' • after the lenses are produced, they are cut (glazed) into the requested frame shape, using an edger • if required, blanks can be surfaced to a very specific diameter to achieve a thinner lens	
K1.22 The types of practitioners who can write and issue a spectacle or contact lens prescription: • optometrist • ophthalmic medical practitioner • ophthalmologist • dispensing optician or contact lens optician (is able to provide a certified copy) • CLO can issue a contact lens prescription	
K1.23 The process for requesting a prescription, if	

Anatomy, prescriptions and visual correction	
required: • contacting appropriate practice if the patient does not have prescription with them • requesting consent from patient to share their information with another practice (may be provided electronically or over the phone)	
K1.24 The definition of transposition in relation to prescriptions: • prescription transposition means the conversion of a written spectacle lens power from one format to another (for example, plus-cylinder form to minus cylinder form or vice-versa)	
K1.25 Why it is necessary to transpose prescriptions: • to ensure the prescription is presented to the laboratory in a consistent format • to prevent error in ordering/manufacture • to enable comparison between an old prescription and a new one • to best understand the thickness in different meridians of the lens	
K1.26 How to recognise a complex prescription as defined by the NHS: • lenses which are either -10/+10 dioptres or more in any one meridian • prism-controlled bifocal lens	
K1.27 How to explain the optical prescription and the impact on the patient's vision: • minus (-) prescription usually indicates short-sightedness (myopia): improves distance vision • plus (+) prescription usually indicates long-sightedness (hypermetropia/hyperopia): may improve distance vision as well as near vision if there is a higher prescription • cylinder indicates astigmatism, due to the	

Anatomy, prescriptions and visual correction	
curvature of the eye being different in different meridians • a reading ADD for near work indicates correction used for near distances (presbyopia): improves ability to read up close; working distance decreases with increasing add • an intermediate ADD indicates correction needed for middle distances: improves ability to see objects at middle distance (for example, computer screens) • a prism enables the eyes to work together comfortably and can also be used to prevent diplopia (double vision) when the eyes do not align together perfectly • plano: indicates zero power • balance: indicates lens power, similar to other eye, for cosmetic reasons **K1.28 The definition of presbyopia, its effect and how it can be corrected:** • definition: o an age-related hardening of the lens • its effect: o difficulty with near vision • how it can be corrected: o single vision near spectacles: ▪ all the lens is for near vision; distance will be blurred o bifocals: ▪ most of the lens is for distance with a section at the bottom which is for near vision with a distinctive dividing line o varifocals/multifocals/occupational: ▪ a continually changing curvature of the lens produces multi-focal effect o specialist lenses (for example, tri-focal, specialist bifocals) o multi-focal contact lenses/monovision contact lenses o contact lenses combined with spectacles	

Anatomy, prescriptions and visual correction	
○ multi-focal lens replacement ○ monovision laser surgery	

Product knowledge: Frames and lenses	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K1.29 The features, benefits, and limitations of the following frame materials:** • metal (for example, nickel, titanium, aluminium, stainless steel): ○ features: lightweight; strong; can be thin; broad range of adjustments ○ benefits: comfortable; long-lasting; can obscure less field of vision ○ limitations: limited range of colours; some metals more difficult to source and repair; risk of allergy • plastic (for example, cellulose acetate, cold glaze, thermoplastic): ○ features: broad range of colours; generally inert; broader rims ○ benefits: broader range of colours and styles; can hide the thickness of a lens edge; low risk of allergy ○ limitations: less range of adjustment; become more brittle with age • natural materials (for example, wood, horn, bamboo): ○ features: aesthetically attractive; can be more environmentally friendly ○ benefits: offers uniqueness and originality; can be reformed under pressure if broken ○ limitations: harder to adjust and manufacture; more expensive than metal or plastic **K1.30 The features, benefits, and limitations of the**	The student must be able to: **S1.89 Apply knowledge of available products to make recommendations for frames and lenses, taking into account:** • intended use (for example, work, home, sport) • the patient's expectation of the product's appearance • the patient's budget • the patient's previous visual issues with products • the existence of any allergies • the prescription requirements • the patient's facial features **S1.90 Explain the advantages and disadvantages of spectacle lens options and the possible impact on vision:** • discussing the features, benefits and limitations of lens options • using information from different sources to provide alternative product recommendations • using language appropriate to the patient's level of understanding and experience (GEC1, GEC5) **S1.91 Use progressive power templates to mark up a varifocal lens** • identifying the markings on the lens

Product knowledge: Frames and lenses	

following spectacle lens materials:
• plastic (for example, CR39, high index – 1.6 or higher – polycarbonate):
  ○ features: plastic is lighter than glass of similar refractive index; plastic is more impact resistant than glass and safer when it breaks; higher index plastic gives thinner and often lighter lenses; different plastics offer different degrees of impact resistance
  ○ benefits: can be lighter and thinner; more impact-resistant; high index can be used for rimless frames
  ○ limitations: can scratch more easily than glass; can be harder to achieve a dark tint; high index plastic lenses can be expensive; increased peripheral distortions in high index; not as thin as the thinnest glass lenses
• glass (for example, crown glass, high index):
  ○ features: high index glass can be thinner than high index plastic; more scratch-resistant than plastic
  ○ benefits: hard-wearing; more cosmetically attractive in higher powers
  ○ limitations: can break into sharp pieces; heavier than plastic; unsuitable for rimless frames, high index glass lenses can be expensive; increased aberration in high index
 	
K1.31 The features, benefits and limitations of the following lens types:
• single vision lenses:
  ○ features: easier for patient to adapt to in comparison with bifocal and varifocal, offers fullest field of vision
  ○ benefits: inexpensive option; simple to use
  ○ limitations: presbyopes must change spectacles for different activities
• bifocal lenses:
  ○ features: less expensive than varifocals; allows presbyopes to see both distance and near in the same pair of spectacles; are available in different segment sizes
	• identifying the design, using a lens catalogue
	• identifying the reading add
	• determining the appropriate power template
	• marking up the:
	  ○ distance zone
	  ○ intermediate zone
	  ○ reading zone
	
	S1.92 Use demonstration aids and other materials to make recommendations to patients on progressive lenses
	• comparing the patient's current lens design against the recommended designs
	• discussing the benefits and limitations for the patient's lifestyle of a certain design

Product knowledge: Frames and lenses	
and shapes ○ benefits: more convenient than distance and reading spectacles ○ limitations: more expensive than single vision; period of adaption required; reduced field of vision; less cosmetically appealing; causes image jump; can lack intermediate range of vision; may cause diplopia where there is a high degree of anisometropia • varifocal lenses: ○ features: allows presbyopes to see distance, intermediate and near in the same pair of spectacles, allowing more varied focusing range; cosmetically less noticeable than bifocals; are available in different designs in order to offer more or less field of view at different viewing differences ○ benefits: more convenient than distance and reading spectacles; more cosmetically appealing than bifocals ○ limitations: can be harder for patients to adapt to in comparison with single vision or bifocal lenses; areas of peripheral distortion; most expensive format of lens; offer a smaller field of view for reading than single vision spectacles; may not suit patients with mobility/balance issues; may cause diplopia where there is a high degree of anisometropia • occupational lenses: ○ features: larger field of view at near and reading than bifocals or varifocals; more depth of vision than reading spectacles ○ benefits: more flexible for working at multiple distances ○ limitations: more expensive than single vision; limited or no distance vision; not suitable for driving; may require an additional pair of spectacles **K1.32 The features, benefits and limitations of the following additional lens options:** • high index (plastic or glass): ○ features: thinner and generally lighter ○ benefits: more comfortable; slip less;	

Product knowledge: Frames and lenses	
cosmetically appealing ○ limitations: increased peripheral distortion; expensive; patient may experience awareness of colour fringing at lens periphery • aspheric (often high index): ○ features: generally thinner and lighter ○ benefits: more comfortable; slip less; cosmetically appealing; less magnification of the eye ○ limitations: may experience awareness of blur when looking at the lens periphery; expensive • tints: ○ features: different lens colours available in various tint densities ○ benefits: more comfortable in brighter light; cosmetically appealing; may help with visual stress ○ limitations: reduce ease of eye-contact; there are legal restrictions on driving with tinted lenses • anti-reflective coating: ○ features: reduces reflections from the lens surfaces ○ benefits: improves visual comfort; improves cosmesis; allows better eye-contact; can provide greater clarity ○ limitations: smudges more easily than untreated lenses; harder to clean; scratches are more obvious • blue light blocking: ○ features: reduce blue spectrum transmission ○ benefits: may reduce visual fatigue when using digital devices; enhance contrast ○ limitations: smudge more easily than untreated lenses; harder to clean; scratches are more obvious • photochromic: ○ features: darken when exposed to ultraviolet (UV) light ○ benefits: negate the need for additional sunglasses; more comfortable in bright light; offer different levels of UV	

Product knowledge: Frames and lenses	
protection ○ limitations: in hot conditions, do not go as dark as sunglasses; lag in colour change; can underperform in combination with car windscreens • polarising: ○ features: allows the passage of polarised light in one plane ○ benefits: reduce glare from surfaces; increase comfort; work well against reflection from wet surfaces, especially wet roads and ski slopes; remove reflection from water ○ limitations: cannot be used for night driving; can mask irregularities in floor and ground surfaces; level of polarised tint cannot be adjusted; limited colour choices; unsuitable for use with liquid display screens • scratch resistant: ○ features: more resistant to abrasion than standard plastic ○ benefits: more durable and longer-lasting ○ limitations: not scratch-proof • hydrophobic: ○ features: hydrophobic ○ benefits: repel water droplets, easier to clean; anti-static ○ limitations: more expensive than non-coated lenses • UV-blocking: ○ features: block UV light ○ benefits: reduce UV damage to the eye ○ limitations: more expensive than non-coated lenses • contrast-enhancing filter: ○ features: reduce transmission of certain wavelengths of light ○ benefits: improve vision for sporting activities and driving ○ limitations: can only be used in limited circumstances	

Product knowledge: Frames and lenses	

K1.33 How facial features, face size and shape may impact on the choice of frame:
• face shape – certain face shapes are more suited to particular frame shapes:
  ○ oval – suit any style frame
  ○ round – suit rounder frames
  ○ square – suit narrower styles
  ○ rectangular – suit square styles
  ○ heart-shaped and triangular – suits wider frames or those with an exaggerated brow line
• facial features – fitting must allow for the patient's nose structure, brow and cheeks:
  ○ a broad head may require a frame with a wide front and long sides
  ○ small or broad nose bridges must be identified to ensure optimal frame fit and may be more accurately fitted with pad bridges
  ○ prominent brows, long lashes or prominent cheek bones may also need pad frames to lift the frame away from the face
  ○ asymmetric ear height may need adjustment of the sides
  ○ more complex fittings may require advice from a qualified/more experienced colleague
 	
K1.34 How the frame may impact on the choice of the lens:
• larger frames with high prescriptions may benefit from high index lenses
• supra and rimless frames will need plastic lenses
• varifocals/multifocals and bifocals may need deeper frames
• smaller frames will be lighter and have a smaller lens aperture, reducing the need for high index lenses
• the larger the difference between the pupil distance and the frame box centre distance, the greater the impact on lens thickness	

Product knowledge: Frames and lenses	

K1.35 The legal requirements relating to dispensing (including collection) of spectacles:
• the following must only be dispensed by a registered DO, CLO or optometrist:
  o children under 16
  o SI or SSI patients
• they must be dispensed against a valid prescription
• they must be manufactured to British Standards
• frames issued must carry the UK Conformity Assessed (UKCA) mark
• records must be kept of who authorised the dispense, who performed the verification of the prescription and who performed the final fitting	

K1.36 The importance of adherence to legal requirements regarding fitting of spectacles: • ensures compliance with General Optical Council (GOC) regulations • ensures safety of the patient • provides consumer protection – the product is 'fit for purpose' • protects the business's reputation • prevents litigation	
K1.37 The potential allergens that may cause a reaction: • frames (for example, nickel reactions can cause red/dry skin and/or itching) • preservatives in contact lens solutions and eye drops (for example, can cause red eyes and irritation)	
K1.38 How to ensure the best vision, fit and comfort of spectacles, taking into account: • correct lens centration • the need to minimise decentration with	

Product knowledge: Frames and lenses	
higher powers • visual comfort • length to bend, which should be behind the ear and along the ear line • correct placement of nose pads on the nose bridge • distance between spectacle lenses and eyes • management of the patient's expectations (for example, advising that it may take a few days to adapt to new spectacles)	
K1.39 Steps to take when using progressive power templates: • locating engravings and marking their position • identifying engravings and marking up the centres • checking lens type/brand used and selecting appropriate power template • marking up the lens, using the template • checking distance optical centre aligns with pupil to ensure correct positioning	
K1.40 When to use progressive power templates: • when the manufacturer's markings have been removed • to mark up in order to measure the lens power • when the patient is having visual problems, to ensure that the measurements have been taken correctly and that the patient is looking through the correct area of the lens • to find the prism reference point and to check the prism • to check the progressive design	
K1.41 When to use a range of demonstration aids to meet an individual patient's needs: • thinner lenses (aspheric and high index): to provide comparison of lens appearance	

Product knowledge: Frames and lenses	
• bifocal lenses: to demonstrate the appearance of different bifocal segments • progressive power: to provide an experience of the sensation and technique of using progressive lenses • tints: to provide a comparison of different tint depth options (colours and light transmission) • anti-reflective coating: to demonstrate the difference between reflective and non-reflective lenses • blue light blocking: to demonstrate the difference between blue control and non-blue control lenses • photochromic: to demonstrate the speed and depth of colour change in response to a UV light • polarising: to provide a comparison between sunglasses and polarised lenses	

Frames and lens measurements and fitting prescriptions up to +/- 10 D	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K1.42 The purpose of measurements taken during frame fitting:** • pupil distances (PDs) (monocular and binocular): to ensure the patient is looking through the optical centres of the lenses • vertical heights: to ensure the patient is looking through the optical centres of the lenses, and, with multifocal/aspheric lenses, to ensure the patient is looking through the optimal part of the lens, and that there is sufficient depth to access the full reading power; in powers greater than + or - 5.00D, vertical heights should be taken to optimise vision • vertex distance: to enable the prescription to be adjusted to account for the distance from the back surface of the spectacle lens to the cornea; this can only be carried out by a registered professional • pantoscopic angles: to ensure a comfortable fit and vision through the lenses, especially with multifocal/aspheric lenses • frontal bow: to minimise distortion when looking peripherally and help ensure a good fit on the temples • length to bend: to ensure enough length on the side to comfortably and securely fit around the ear • box lens size: to ensure the optimal blank size is ordered/available • bridge width: to ensure a comfortable fit on the nose **K1.43 The effect on vision if incorrect measurements are taken:** • blurred vision • diplopia • poor focusing • visual discomfort/asthenopia	The student must be able to: **S1.93 Take the required measurements for ordering or manufacturing spectacles:** • using appropriate tools and equipment • taking accurate measurements to include: ○ pupil distances (PDs) (monocular and binocular) ○ length to bend ○ vertical heights (GMC1) **S1.94 Identify suitable fitting frames based on facial and prescription requirements:** • facial requirements: ○ the frame front should be fitted level with the brow ○ nose pads, where relevant, should fit flat to the nose ○ bridge should be aligned to the nose shape ○ the lenses should not touch the lashes ○ the frame should be fitted at a suitable pantoscopic angle ○ there should be no contact at the temples but good contact beyond this point (not too tight or loose) ○ the tips should bend behind the ear and remain in contact with the mastoid bone • prescription requirements: ○ there must be enough frame depth to fit a multifocal/bifocal, if appropriate ○ box size measurements appropriate to the power of the lenses **S1.95 Explain pupillary distance, vertex distance and pantoscopic angles to the patient:** • using language appropriate to the patient

Frames and lens measurements and fitting prescriptions up to +/- 10 D

K1.44 How to check vision and fit for multiple spectacle lens types:

- placing spectacles on the patient and checking:
  - pantoscopic angle
  - frontal bow
  - length to bend
  - vertex distance
- checking head width
- asking the patient to view something appropriate for the use and expected visual acuity (VA)
- checking physical and visual comfort
- providing written advice (knowledge guide)
- following SOPs (depending on the practice)

K1.45 Precautionary recommendations to issue to patients on final fitting:

- remind the patient of the use and limitations of the product (for example, multifocals and bifocals may cause a tripping hazard)
- advise the patient to allow time for adaptation
- return the product for further adjustments if required

K1.46 The purpose of, and how to safely use, a range of optical tools:

- pliers (to include double nylon jaw pliers, angling pliers, snipe nose pliers, cutter pliers, nose pad pliers, axis pliers):
  - purpose: to adjust the frame to suit or to match the patient's facial measurements
  - how to safely use: use according to standard operating procedures (SOPs) (for example, using protective eyewear when appropriate, working at a safe distance, performing adjustments away from patients)
- file:
  - purpose: to ensure that the frame has no sharp edges (for example, when

- using examples to illustrate the effect
- checking that the patient understands
- checking whether the patient has questions for clarification

(GEC1)

S1.96 Explain appropriately to the patient how equipment will be used as part of the fitting and measuring process, including:

- using non-technical language to explain the purpose of the selected equipment
- using graphics and other tools to aid understanding
- signposting when there will be physical contact or the need to take a physical measurement
- checking the patient's understanding of the explanation
- gaining consent to touch the patient's head or face as part of fitting/measurement

(GEC1)

S1.97 Use optical tools and equipment in close proximity to the patient without making the patient feel uncomfortable:

- seeking permission from patient to perform test/measurement or make physical contact
- communicating, in a clear and unambiguous way, what function is about to take place, why it is required and what the patient will experience

(GEC1)

S1.98 Make the following spectacle frames adjustments:

- types of adjustments
  - frontal bow
  - pantoscopic angle
  - length to bend

Frames and lens measurements and fitting prescriptions up to +/- 10 D

shortening the length of the sides)
    - how to safely use: avoiding scratching parts of the frame that aren't being filed
- screwdriver set:
    - purpose: to tighten, remove and replace screws
    - how to safely use: using the correct size to avoid stripping the thread; applying the correct amount of pressure; supporting the frame at all times

K1.47 The purpose of, and how to safely use, a range of optical equipment:

- manual and automatic focimeter:
    - purpose: to measure the power of single vision, bifocal and progressive lenses
    - how to safely use: ensuring the frames are square and flat on the measuring surface; ensuring the frames are not damaged during the clamping process (for example, ensuring pads are present)
- inter-pupillary measurement device:
    - purpose: to measure inter-pupillary distance, in order to put the optical centres of the spectacles in front of the patient's pupils
    - how to safely use: ensuring the device is used safely and disinfected between uses
- frame heater:
    - purpose: to soften plastic frames to the appropriate temperature in order to adjust, or spring in or out lenses (should not be used with cold glaze frames)
    - how to safely use: avoiding excessive temperature with delicate products; not overhearing to avoid skin irritation
- screening equipment (to include non-contact tonometer, auto refractor, visual field screeners, retinal camera, Optical Coherence Tomography (OCT)):
    - purpose: to provide clinical data to the optician about the patient's eye
    - angle of letback
    - downward angle of drop
    - frontal angle of pad (only on frames with adjustable pads)
    - splay angle of pad (only on frames with adjustable pads)
- frame types
    - full-framed, either metal or plastic, including acetates

S1.99 Measure the prescription of the following types of spectacles using an automated focimeter:

- varifocal
- bifocal
- single vision

S1.100 Assess fitting and measurements to solve non-tolerance problems raised by patients:

- measurements to include:
    - power of the lenses
    - the PD measurements
    - fitting heights
    - vertex distance
    - pantoscopic angle

(GMC1)

S1.101 Identify how the fitting of the frame can affect the patient's vision:

- describing the effect on vision of poor spectacle frame fitting for a variety of causes (for example, vertex distance, tilted frame)

S1.102 Meet legal requirements when measuring and supplying spectacles:

- identifying when it is necessary to refer to a registered DO or optometrist
- check frames have appropriate markings
- establish any patient allergies or

Frames and lens measurements and fitting prescriptions up to +/- 10 D	
○ how to safely use: disinfecting between each use; ensuring the patient is positioned appropriately; communicating what the patient should expect to happen; ensuring no part of the machinery comes into contact with the patient's eye; removing any surrounding hazards (for example, wires, cables, trip hazards); following the practice's SOPs, where appropriate **K1.48 The limitations of a range of optical equipment:** • auto refractor: ○ contact lenses will throw measurements off ○ cataracts and other eye conditions can make it difficult to obtain accurate measurements ○ results can fluctuate with young children's accommodation • non-contact tonometer: ○ some patients may be reticent to experience the puff of air ○ can be difficult to get readings due to blink reflex, ptosis (droopy eyelid), epiphora (watery eye), cataracts, poor fixation ○ can provide various results depending on time of day • Optical Coherence Tomography (OCT): ○ cataracts and other eye conditions can make it difficult to get any accurate measurements • visual field screener: ○ can be difficult to get readings due to ptosis ○ difficulty with fixation in patients with macular degeneration ○ not appropriate for patients who have difficulty with spatial awareness ○ can result in false positives and false negatives ○ results vary depending on patients' cooperation ○ the visual field defect may not be within	intolerances **S1.103 Demonstrate best practice when measuring and supplying single vision spectacles:** • clearly explain to the patient the purpose and function of the spectacles • ensure the spectacles are suitable for the patient's needs • ensure the patient understands that they can return for adjustments if required • take appropriate measurements before ordering the spectacles (for example, facial and frame measurements) • check that the spectacles correspond to the written prescription • fit the spectacles to ensure the correct plane, height and position • check fit and comfort and make any adjustments before the patient takes them away • offer a visual comfort check to ensure the correct acuity (for example, a near visual acuity chart) **S1.104 Input the optical order onto the relevant IT system or make manual order:** • accurately inputting all required data

Frames and lens measurements and fitting prescriptions up to +/- 10 D	
the examined area • fundus camera o reduced field of view in some instruments o inaccurate focusing o media opacity o small pupils can result in poor image quality **K1.49 The legal requirements for measuring and fitting spectacles:** • for under 16s, the initial frame selection must be approved by a registered DO or optometrist • final fitting for the following must be supervised by a registered DO, CLO or optometrist: o children under 16 o those registered SI or SSI o complex prescriptions (as defined under NHS regulations) • the registered DO or optometrist cannot dispense or issue spectacles to an unaccompanied child under 16 • British Standards require vertex distance to be included in any prescriptions of ±5.00D or above **K1.50 The health and safety requirements for supplying the following products:** • safety/protective eyewear: o when safety spectacles are supplied with side shields, these must not be removed or adjusted o the optical assistant must not undertake repairs on safety spectacles o all lenses and frames must be kite marked with BS, (British Standard for impact resistance) o must be ordered in line with the requirements of the patient's work-based risk assessment	

Frames and lens measurements and fitting prescriptions up to +/- 10 D	

• contact lenses:
  ○ must only be issued under the supervision of a registered DO or optometrist
  ○ the patient must have had an up-to-date aftercare appointment
 	
K1.51 Best practice for measuring and fitting spectacles:
• a record must be kept of:
  ○ exactly what product has been supplied
  ○ what advice has been given
  ○ who fitted the spectacles
  ○ the name and General Optical Council number of the supervising individual, where appropriate
  ○ verification that prescription has been accurately entered
  ○ verification that the prescription has been accurately manufactured
• safety products should be suitable for the intended hazard to which they are exposed (for example, heat, chemical, impact)
• the appropriate frame and lens selection should take into account the patient's lifestyle (for example, occupational lenses for VDU users; needing more than one type of spectacles)
 	
K1.52 How to make an optical order using IT systems or manual forms, taking into account:
• legibility
• accuracy and completeness
• the need for a backup in case of IT system failure
• the common information that will be collated in all systems:
  ○ patient consent (for UK GDPR purposes)
  ○ patient details
  ○ patient measurements	

Frames and lens measurements and fitting prescriptions up to +/- 10 D	
○ any advice given ○ prescription details ○ order number ○ frame details	

Screening	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K1.53 The purpose of retinal imaging:** • collecting photographs of the anatomy of the eye, including: ○ optic disc ○ blood vessels ○ macula ○ 45º central view of the retina • helping to examine the state of the eye and provide baseline data for comparison • viewing the peripheral retina **K1.54 The different types of image capture available:** • fundus (retinal) photography (FP) • optical coherence tomography (OCT) – may not be found in all practices • corneal topography • slit-lamp photography • ultra-widefield retinal imaging (may not be found in all practices) **K1.55 The purpose of screening tests and why they may have to be repeated:** • purpose of screening tests: ○ check for early signs of eye disease ○ establish baseline data of what is	The student must be able to: **S1.105 Clearly explain screening checks to patients, the reasons they are done and how the equipment works:** • seeking permission from patient to perform test/measurement or make physical contact • clearly communicating and demonstrating what function is about to take place, why it is required and what the patient will experience, using language appropriate to the patient (for example, “You may feel a puff of air” for a non-contact tonometer) • responding to the patient’s questions • offering reassurance and explaining the benefit of the test to the patient (GEC1) **S1.106 Accurately and safely undertake the screening process:** • capturing the patient’s readings consistently and repeatedly • identifying which readings are of good quality (for example, sharp image with a photograph) • identifying when a reading needs to be repeated (for example, camera artefacts visible on photographs) • ensuring the patient is positioned appropriately • disinfecting between each use

Screening	
normal for the patient • why they may have to be repeated: o when of poor quality o some results vary with time of day (for example, pressure tests) o to comply with specific refinement and referral protocols, to ensure valid results **K1.56 The purpose of the following screening tests and the equipment used for each:** • pressure test (tonometry): to assess the internal pressure of the eye to screen for glaucoma: o equipment used: tonometer (contact and non-contact) • visual field test: to detect any defect in the visual field, and to help confirm legal requirements for driving: o equipment used: automated perimeter, Amsler grid • auto-refraction: objectively indicates the patient's prescription: o equipment used: automated refraction system • optical coherence tomography (OCT): provides a more detailed scan of the retinal layers: o equipment used: optical coherence tomographer • fundus photography: provides an image of the retina o equipment used: fundus camera, sometimes combined with the OCT • auto-keratometry: measures the corneal curvature; used for contact lens fittings o equipment used: auto-keratometer (often combined with the auto-refractor) • focimetry: measures the power of the patient's existing prescription and helps the optician to establish the best new prescription, and whether there has been a change o equipment used: automated focimeter	• ensuring no part of the machinery touches the patient's eye • removing any surrounding hazards **S1.107 Support and reassure patients when recalling them for repeat screening:** • clearly communicating why the patient has been recalled • emphasising the importance of the repeat visit • using reassuring language appropriate to the patient • acknowledging the patient's feelings • ensuring the patient understands that their results are important and will be reviewed by their optometrist • referring to the appropriate member of the optical team when needed (GEC2) **S1.108 Accurately input and record screening results onto the relevant IT system:** • accurately inputting all required data (GDC1)

Screening	
K1.57 The relationship between ocular anatomy and the screening process: • eyelids/eye lashes: o the eyelids and lashes need to be sufficiently open to achieve a good result • tear film: o needs to be stable enough to achieve good quality readings o as the tears evaporate, the patient is inclined to blink more, which can pose problems in acquiring or achieving a quality reading • cornea: o asymmetric curvature can provide incorrect readings o over- or under-focus will lead to a refractive error o any corneal opacities can lead to problems achieving good results o different corneal thickness causes under or over-estimation of intra-ocular pressure (IOP) measurements • aqueous humour: o the volume of generated aqueous humour leads to variations in eye pressure o production levels vary due to a range of factors (for example, time of day, consumption of fluids) • iris: • a small pupil can prevent some of the automated tests from functioning, or lead to a poor image • crystalline lens: o over- or under-focus will lead to a refractive error o the presence of cataracts can lead to poor readings, poor image quality and inaccurate visual field results • ciliary body and lens: o can cause the patient to focus at near rather than distance, leading to an inaccurate auto-refractor result	

Screening	

• vitreous humour:
  o can be visible when using an OCT machine
• retina:
  o is visualised on the OCT and fundus camera (for example, diabetic patients can show haemorrhages on the fundus photograph)
• choroid:
  o is visualised on the OCT
• macula:
  o is visualised on the OCT and fundus camera
  o its function can be assessed with field screening programmes
  o a damaged macula makes it difficult to accurately fixate while performing any of the tests
• optic nerve:
  o is visualised on the OCT and fundus camera
  o the function of the optic nerve can be assessed through a visual field test	

K1.58 The consequences of incorrect or inaccurate screening: • if incorrectly performed it may negatively impact on a patient's wellbeing (missed pathology) • false positives and false negatives may cause patients undue worry • creates time pressures if tests need to be repeated	
K1.59 The impact on vision of the following diseases and systemic medical conditions: • glaucoma: leads to gradual loss of vision if untreated, starting with peripheral loss; patients with this may find field tests harder to perform • cataracts: causes gradual general blurring of vision; can affect colour perception; causes glare; the presence of this may	

Screening	
obscure fundus photographs/OCT images, and make it harder to achieve an auto-refractor reading • macular degeneration: causes loss and/or distortion of central vision; may make it difficult to read or fixate on screening test targets • retinal detachment: if untreated, can lead to total loss of sight • diabetic retinopathy: causes variation in prescription; causes gradual loss of vision; if untreated, can cause extensive visual loss through secondary visual glaucoma, vitreous haemorrhage and retinal damage **K1.60 Situations that require referral to a senior colleague when using screening equipment:** • when the test cannot be performed (for example, faulty or uncalibrated equipment; presence of cataracts; patient refusal; the patient is unable to perform the screening test) • when the patient is asking questions about the results	

Customer records and information	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K1.61 What common information is required in a patient record:** • full name and address • date of birth • contact details (for example, email address) • parent/guardian consent for treatment of under 16s and vulnerable adults • General Practitioner (GP) details • record of General Data Protection	The student must be able to: **S1.109 Ensure all required patient records and information are accurately recorded and securely stored** (GDC1, GDC5) **S1.110 Check eligibility for NHS assistance and sensitively deal with patients who are not eligible for treatment:** • ascertaining if the patient is eligible for a sight test (for example, checking last sight

Customer records and information	
Regulation (UK GDPR) consent • date of consultation • full record of any tests carried out and advice given • any other information required by practice SOPs **K1.62 The possible consequences of inaccurate record keeping in an Optical practice:** • misdiagnosis, which could cause patient harm and/or visual loss • incorrect recall frequency • incorrect judgements about patient eligibility/ineligibility • the practice may be unable to make NHS claims • failure to contact patient if contact details are incorrect • not complying with UK GDPR if patients contact and marketing preferences not correctly inputted • incorrect patient charges • failing a clinical audit • incorrect ordering • legal implications **K1.63 Requirements for securing patients' information in line with UK GDPR requirements:** • locking all paper records away • keeping patients' records for 10 years after they were last seen, or up to their 25th birthday • ensuring records are not in public sight • logging out of screens when leaving them • immediately discarding/shredding records if no longer needed • not reading aloud any personal information (for example, address, mobile number) • following SOPs in relation to:	test date to ensure compliance with NHS rules on sight test intervals) • asking for evidence of eligibility and recording any evidence that was seen • identifying the patient's eligibility for state-entitled benefits • sensitively explaining the reasons for ineligibility in accordance with NHS regulations, using appropriate tone and register • explaining how the patient might become eligible, if relevant (GEC2) **S1.111 Explain to patients the processes and procedures being followed when completing records to maintain confidentiality and data protection:** • communicating, in a clear and unambiguous way, how the practice will store and share the patient's personal data • communicating how the practice will use the patient's data • collecting patients' personal data in a private setting (GEC1, GDC6) **S1.112 Complete the following information on the required NHS form, recording information accurately and concisely:** • patient's personal details • supplier's/provider's details • person getting the benefit • date of eye test or supply of spectacles • date of last test • GP information • details of establishment (for example, school, college or university) • patient's grounds for eligibility • patient's declaration

Customer records and information	
○ recording only relevant and factual information (for example, not speculating about a patient) ○ recording and retaining information within specific timeframes ○ reporting inaccuracies to the relevant individual responsible for UK GDPR within the business ○ recording the required patient details ○ gaining the patient's consent to store and share personal data **K1.64 UK GDPR requirements at work:** • keeping passwords and PINs secure and updated • logging out of computers upon leaving a desk • securely storing hard copies of patient information in lockable draws if other members of the public are in the vicinity • not giving information about patients to any third party without the patient's permission • collecting patients' personal details in a private setting (for example, where the patient cannot be overheard) • ensuring patient permission for information to be transferred in the event of prescription requests **K1.65 Who is eligible for an NHS examination and financial assistance under General Ophthalmic Services (GOS) entitlement** • the difference in eligibility throughout the United Kingdom (for example, Scotland offers free eye examinations for all) • the range of NHS forms and when they are used **K1.66 The NHS England minimum sight test intervals and exceptions due to clinical need, including:** • under 16 years, in the absence of any binocular vision anomaly: 1 year	(GEC5) **S1.113 Interpret and evaluate patient data in relation to eligibility for an NHS voucher or eye examination** • establishing the patient's eligibility • establishing whether the patient is due an examination • submitting the claim • reconciling the payment • resolving any rejected payments (for example, if any key information is missing from the form) **S1.114 Adhere to SOPs when patients or other practices request a copy of the prescription**

Customer records and information	
• under 7 years with binocular vision anomaly or corrected refractive error: 6 months • 7 years and over and under 16 with binocular vision anomaly or rapidly progressing myopia: 6 months • 16 years and over and under 70 years: 2 years • 70 years and over: 1 year • 40 years and over with family history of glaucoma or with ocular hypertension and not in a monitoring scheme: 1 year • diabetic patients: 1 year **K1.67 What to do if the patient requests a test before their recall date:** • offer private sight tests • refer to registered optical professional for mitigating circumstances **K1.68 Possible instances of fraud in relation to NHS claims:** • patient fraud: o claiming financial assistance to which they are not entitled • practice fraud: o recalling patients before the minimum interval without clinical reason o claiming a higher value than the value of the repair o claiming a higher value than the value of the of the spectacles supplied **K1.69 What makes a valid spectacle prescription, including duplicate prescriptions, in accordance with GOC regulations:** • patient's personal details • the practice's address • name and signature of the examining optical professional • registration number of the person signing	

Customer records and information	
the specification • the date of examination • expiry date • sufficient details to enable the spectacles to be dispensed **K1.70 What to do when issuing or requesting a duplicate prescription:** • patients must give written or verbal consent to the transfer of records • duplicate prescriptions must be checked and signed by a registered optical professional	

Performance outcome 2: Provide spectacle collection, adjustments and repair services

Spectacle collection and adjustment	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K2.1 How to interact with patients at the time of collection, including those with specific additional requirements:** • patients should expect the optical assistant to: o greet them politely o recognise any hidden disabilities (for example, sunflower card/lanyard) o maintain appropriate eye-contact o use the patient's name, if known o listen without interrupting o speak slowly and clearly o speak directly to the person o avoid jargon when explaining the collection procedure o refrain from making assumptions about the patient's needs • patients may also require: o hearing loop o a chaperone o specific appointment times (for example, when the practice is quieter) o wheelchair access (for example, to access a downstairs testing room) o materials in languages other than English/use of an interpreter **K2.2 The details required from patients at the time of collection:** • personal data: o name o address	The student must be able to: **S2.15 Greet patients at time of collection:** • speaking politely and confidently, using appropriate tone and register • confirming what the product being collected is for (for example, if the patient has ordered more than one product) • informing the patient of what will happen next, asking questions to check understanding • establishing whether the patient has any additional requirements • showing the user to seats, if required • updating the patient on any waiting times or delays • ensuring advice has been given regarding spectacle use, with supporting written material if appropriate (for example, how to use their varifocals) (GEC1, GEC2) **S2.16 Verify required details from patients at the time of collection:** • double-checking the personal data held in adherence to UK GDPR: o name o address o date of birth • making sure the correct spectacles are handed to the correct person **S2.17 Refer to British Standard guidelines when re-verifying lenses:** • using an automated focimeter and the British Standards tolerances to ensure

Spectacle collection and adjustment	
○ date of birth • confirmation of the patient's identity	spectacle prescription accuracy (GDC4)
K2.3 The elements that must be checked to ensure comfortable fitting of the spectacles: • how the spectacles fit on the bridge • how the spectacles fit on the temples • how the spectacles fit on the ears • how the spectacles fit behind the ears where a hearing aid is present • do the spectacles appear level on the face? • do the spectacles appear to have an appropriate pantoscopic angle? • is there a suitable bow on the frame? • are spectacles slipping? • are the spectacles fitting at the correct height? • are the lenses suited to the intended purpose? • the position of nose pads for varifocals and bifocals • the patient's visual comfort • the vertex distance	**S2.18 Carry out the necessary frame adjustments, using the appropriate equipment, to ensure on-going comfort and correct vision:** • bow of the frame • pantoscopic tilt • length to bend • downward angle of drop • length of drop • splay angle of pad • frontal angle of pad • angle of letback • frame temple width • frame head width • the position of the lens' optical centre (for example, to ensure it is correctly centred on the eye)
K2.4 When to use verification locating and marking apparatus: • when manufacturer's marks have been removed from varifocals • when investigating a returning patient's visual difficulties with a varifocal	**S2.19 Explain to the patient how to use the product:** • for single vision lenses: ○ reminding the patient of the intended purpose of the spectacles (for example, driving, reading) • for multifocal/bifocal lenses: ○ advising the patient of the correct position of the head and eyes when using the spectacles ○ reminding patients of limitations of spectacles • for occupational lenses: ○ advising the patient of the environments unsuitable for their spectacle lens type (for example, the wearer cannot walk around or drive while wearing some occupational spectacles)
K2.5 The consequences of poor fitting: • poor vision • discomfort • possible complaint/request for refund • requirement to remake the spectacles • loss of reputation for the practice	**S2.20 Discuss and recommend additional and**

Spectacle collection and adjustment	
• risk of injury to patient • possible rechecks and the time/cost implications for the practice **K2.6 The types of frame adjustments that would be completed using a frame heater and pliers:** • bow of the frame • pantoscopic tilt • length to bend • downward angle of drop • splay angle of pad • frontal angle of pad • frame temple width • frame head width **K2.7 The types of frame materials that may require adjustment:** • plastic (for example, cellulose acetate, cellulose propionate and nylon) • thermoplastic • metal (for example, nickel, titanium, aluminium, stainless steel) • natural materials (for example, wood, horn, bamboo) **K2.8 Good practice for after-sales service and patient care:** • advising patient that they can call back at any stage if they have problems or for an adjustment • advising on spectacle lens maintenance (for example, lens cleaners) • advising on adaptation timescales and the nature of the adaptation • advising on product guarantees (for example, manufacturer warranties on varifocal supply) • adhering to after-sales practices (for example, providing free lens cases or	**suitable products for the care of spectacles and services as appropriate to the patient:** • actively listening to patients' responses and asking questions for clarification • suitable products could include: o lens cleaning solution o lens wipes o anti-fog wipes o microfibre cloths o hard/soft cases o sports bands o pocket screwdriver kits o spectacle cords and chains o warrantees/breakage policies • discussing any further aftercare (GEC6) **S2.21 Check visual comfort of the final product, based on the prescription requirements:** • using an appropriate target object at an appropriate distance to check the visual comfort for which the spectacles will be used • carrying out a final check once all adjustments have been made **S2.22 Identify and resolve any errors found in a spectacle order:** • checking the spectacles against the order for: o prescription o frame o colour/style/size o optical centres o tint o heights o lens material (for example, coatings) o lens thickness o lens design, using a power progressive

Spectacle collection and adjustment	
cloths) **K2.9 Strategies for dealing with situations where the patient is unable to collect spectacles in person:** • following pre-fitting procedures before sending the spectacles for manufacture • keeping accurate records of collection requirements (for example, postage, couriering or collection by a third party) • offering a domiciliary visit (for example, in the case of varifocals) • offering proxy collections • offering follow-up consultation	template o lens fitting/glazing • following relevant SOPs to escalate an error to a senior colleague (for example, offering to remake, where a recheck is needed, to confirm remeasurements) **S2.23 Explain after-sales service in line with SOPs (for example, if adjustments are required):** • actively listening to patients' responses and asking questions for clarification • advising patients of: o product guarantees o warrantees o any additional offers (GEC6)

Spectacle repair	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K2.10 A range of reasons that spectacles may require repair:** • bent or twisted frames • broken spectacles • scratched lenses • missing nose pads • missing screws • missing sides • lens fallen out of a plastic/metal/supra frame • nylon cord snapped in a supra frame **K2.11 The range of possible repairs that can be made within the optical environment:**	The student must be able to: **S2.24 Take measurements to be able to adjust and repair spectacles as required:** • using a ruler to accurately and precisely measure the length to bend in millimetres before adjusting • using an automated focimeter and power templates, if needed, to mark and measure the optical centres • measuring length of drop • using a power progressive lens template to mark multifocal lenses (GMC1) **S2.25 Carry out repairs and adjustments on an on-going basis:**

Spectacle repair	
• changing the tips on metal sides • changing/replacing nose pads • changing/replacing entire frame • changing/replacing front/sides • tightening and replacing screws • replacing broken or scratched lenses • soldering metal frames • replacing cord in supra spectacles • tighten up nuts and bolts on rimless spectacles (taking care not to overtighten) • replacing a rimless mount plug **K2.12 The damage that can occur when incorrect tools or equipment are used:** • broken frame • melted or marked plastic frame • damaged paintwork • damaged lenses • damaged coatings • inappropriate cleaning solution can damage frames and lenses (for example, polycarbonate lenses haze with acetone) • injury to self and others **K2.13 The types of adjustments or repairs that are not usually carried out in the optical practice or by an optical assistant:** • welding/lasering stainless steel and titanium frames • soldering frames without discolouration • reglazing/redrilling of rimless spectacles • applying glue to plastic frames • using adhesive tape to repair frames • repolishing scratched lenses or coatings • adjusting nylon frames • repairing safety spectacles • repairing special optical appliances (for	• replacing nose pads • adjusting length of side • refitting frames • replacing a screw • removing and replacing end tips • replacing a nylon cord in a supra frame **S2.26 Explain to patient how to care for and maintain spectacles:** • advice may include: ○ using spectacle lens cleaners ○ using a case ○ using two hands to remove spectacles ○ not putting spectacles on the top of the head ○ cleaning lenses with appropriate microfibre cloths ○ not leaving coated lenses in direct sunlight ○ avoiding interactions with chemical-based solutions ○ not putting spectacles face-down on a surface • providing written material as appropriate (for example, a spectacle care leaflet)

Spectacle repair	
example, sports spectacles and swimming goggles) • repairing low vision appliances **K2.14 Strategies for dealing with situations where the patient is unable to instigate the repair in person:** • establishing the nature of the repair, possibly with photographic evidence • advising of any limitations of the repair • obtaining the patient's consent • taking a deposit or full payment in advance, as appropriate	

Performance outcome 3: Undertake retail activities to provide walk-in customers with a range of products and optical services

Different optical environments	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K3.1 The range of optical environments:** • independent optical practices • multiple optical practices • hospital • charity • domiciliary • dispensing-only practice • laser clinics • manufacturing laboratory • practice with specialities (paediatric, contact lens, dry eye) **K3.2 The differences in working practices and requirements within different optical environments:** • hospital eye units: o hospital eye units often focus on specialised care of patients with low vision problems, keratoconus, corneal graphs and very young children o dispensing is very often completed solely by the dispensing optician o eye departments have a more clinical feel • independent opticians: o independent optical practices are often owned and run by the optician o patient base is often smaller than multiple optician o independent optical practices may run with lower staffing levels, with staff having wider responsibilities (for example, the optician may carry out pre-screening as well as the sight test)	**(No skills in this section)**

Different optical environments	
○ independent practices can offer less geographical opportunity to their employees ○ dispensing is often carried out by dispensing opticians, with less reliance on the supervision of non-clinical colleagues ○ receptionists or administrators may conduct non-clinical administrative tasks ○ can be dispensing-only practices ○ can, in some cases, offer eye examinations without dispensing ○ can sometimes offer exclusively non-NHS examinations ○ often, due to the size of practice and wider breadth of role, fewer tests are completed per day, leading to a slower-paced environment ○ often run with fewer clinics than larger multiple practices ○ there may be fewer opportunities outside of clinical roles (for example, management roles, regional roles and support office roles) ○ some independent practices may offer more specialised services (for example, dyslexia and diabetic eye screening) • multiple high street opticians: ○ have a faster-paced working environment ○ often run multiple clinics at one time ○ often have a larger focus on brand values, brand image and brand atmosphere ○ often have specialised teams to deal with administrative tasks (for example, appointment booking, clinic preparation and administrative tasks ○ run with larger teams, often including management and supervisory roles, with clinical colleagues often acting as supervisors for regulated, delegated activities (for example, dispensing to restricted groups) ○ often have a wide support network outside of the practice, responsible for purchasing decisions, concern handling, advertisement, colleague development	

Different optical environments	
○ often support a wide range of pre-registration opticians and dispensing opticians, due to larger clinic opportunities ○ some partner with large supermarket chains or supermarket chains that provide their own optical services • domiciliary opticians: ○ work in a mobile capacity, visiting patients who are unable to attend a high street practice, which often involves visiting patients in their homes or larger care settings ○ often work with frail, infirm, elderly patients, or those with impaired mental capacity ○ optical assistants in this environment are often required to work alone and travel between multiple locations each day, taking a range of products with them ○ optical assistants are often required to arrive before the optician to carry out risk assessments and capture patient information in preparation for the test, including medical histories, in addition to spectacle-use information ○ optical assistants are often required to set up testing equipment and explain the testing process before the optician arrives • types of patient/segmentation: ○ optical: non-presbyopic and presbyopic; contact lens wearers; prescription-based; clinical symptoms; retail purchases ○ fashion-focused ○ function-focused - occupational requirements (for example, safety eyewear) ○ price-led (for example, patients with budgetary constraints) ○ NHS vs private	

Retail activities in Optical Care Services

Retail activities in Optical Care Services	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K3.3 Standard Operating Procedures (SOPs) for appointments and booking systems, including:** • asking a range of questions to establish the most appropriate appointment type (for example, eye test or contact lens aftercare) • recording additional information from the patient (for example, any symptoms, duration of symptoms, and last eye test, if new patient) • accurately recording patient information • establishing whether the patient has any additional needs (for example, wheelchair access or interpreter) • giving pre-appointment advice in line with practice SOPs (for example, wearing contact lenses to a contact lens aftercare and/or bring current spectacles to the appointment) • Managing the diary, including: o selecting types of appointment and their length o choosing which time slots to offer first, to ensure business productivity o booking enough time for the appointment to carry out the required service **K3.4 The various types of appointment available:** • NHS or private eye examinations, with the option of scans (for example, Optical Coherence Tomography (OCT) or retinal photos) • contact lens after care • contact lens fitting • contact lens tuition on insertion and removal • sight test and contact lens aftercare combined	The student must be able to: **S3.21 Adhere to SOPs when managing appointments and using booking systems:** • establishing and book the appropriate appointment for the patient • asking appropriate questions to establish the needs of the patient • booking the appropriate appointment, within the appropriate timescale • accurately recording all information provided by the patient • confirming the patient's details • adapting appointments for a patient's additional needs, if required • ensuring appropriate resources are available for the appointment **S3.22 Deal with all patients in a polite and courteous way:** • offering a positive greeting • addressing patient by preferred name, title or pronoun • establishing the patient's requirements through active listening **S3.23 Complete sales transactions, adhering to relevant policies and procedures and applying principles of ethical selling:** • accurately calculating the value of the sale and offering to close the sale • accurately taking payment • factoring in any NHS entitlements/payments • accurately recording the sale transaction • offering to provide a sale receipt **S3.24 Make appointments and deal with price**

Retail activities in Optical Care Services	
• emergency appointments • spectacle dispensing/collection/adjustment/repair • specialist appointment (for example, for patients with autism or sensory needs, or children/vulnerable adults who must be accompanied) • recheck • diabetic screening • local enhanced services and pathways (for example, Minor Eye Conditions Service (MECs) and glaucoma refinement schemes) • additional healthcare services (for example, dry eye management, colorimetry, overlay assessment, hearing care appointment, public health tests) • dilation **K3.5 Types of retail activities within different optical environments:** • spectacle sales • contact lens sales • accessory sales • sunglasses sales • additional optical care services (for example, dry eye management, colorimetry, overlay assessment) • additional non-optical services (for example, hearing care appointment) **K3.6 The principles of ethical selling:** • ensuring that operational or commercial targets do not adversely affect patient care or staff members' judgement • only providing or promoting equipment that is fit for its intended use and in a good state of repair • giving patients honest, accurate information • ensuring that operational or commercial pressures do not impinge on patients' time	**enquiries from patients:** • establishing the patient's needs • booking appropriate dispensing appointment to discuss patient's needs in greater detail • offering leaflets and promotional materials • offering an accurate quote for products through written or verbal methods • Where appropriate, referring to website for further information **S3.25 Display products to maximise sales:** • ensuring products are clean and presentable • ensuring shelves are stocked and complete, without gaps • displaying popular products more visibly • ensuring supporting information is close to the relevant product • following the practice's marketing display/layout plan • positioning products correctly and appropriately **S3.26 Maintain adequate stock levels of all products, following procedures for reordering and for incoming and outgoing products, being mindful of waste levels:** • correctly using the stock control system • replenishing low stock levels (for example, from storage compartments, to keep displays full) • maintaining stock rotation (for example, putting products with a near expiry date to the front) • checking deliveries against orders to ensure the practice is not under or over supplied with products • checking delivery to product cost • ensure products are accurately priced (GDC6)

Retail activities in Optical Care Services	
to process any information or advice • ensuring patient's purchases are appropriate to their needs (for example, only selling products that will have genuine value for the patient) • clarifying guarantee and warrantee information **K3.7 Best practice when ethically selling optical products:** • maintaining knowledge of pricing structures and cost of products • asking questions to establish best product for the patient (for example, a presbyope who needs to work at multiple distances may be best suited to a varifocal, rather than reading spectacles) • making recommendations based on a patient's lifestyle (for example, a wrap-around frame for a cyclist) • recommending different lens options (for example, high index/varifocals) • providing the full range of options and services and/or discussing those that best fit a patient's needs • establishing the budget to suit the patient's requirements, without making assumptions • maintaining knowledge of spectacle voucher values and to whom the entitlement applies • ensuring value for money (for example, making the best use of current promotions) • displaying products according to the practice's guidelines **K3.8 The purpose and properties of a range of different retail products available in the optical environment:** • cleaning solutions/wipes: o purpose: minimise scratching and ensure longevity of product o properties: solvents that, when applied to surfaces, clean away deposits	**S3.27 Identify areas of potential fraud with NHS claims:** • assessing the validity of a claim, including: o frequency of eye test o accuracy of claim submission o signatures o whether the appropriate product has been provided **S3.28 Ensure products are fit for sale and handle products carefully:** • checking the condition of products and packaging for damage and intended purpose • ensuring that all products, particularly consumables, are: o within date, ensuring shelf life remaining on consumables (for example, contact lens solution) is sufficient for the product to be used before the expiry date o undamaged – checking for scratches, paintwork damage, surface marks on packaging o correctly packaged and labelled with appropriate UK Conformity Assessed (UKCA) markings • using appropriate cleaning products • gently presenting and storing frames **S3.29 Handle payments and transactions in an optical care environment:** • offering to issue a receipt/VAT invoice, where appropriate, with every transaction • accurately recording all payments • taking payment securely over the phone, taking into consideration patient's confidentiality • taking deposits safely and securely • accurately and securely setting up direct debits

Retail activities in Optical Care Services	

• contact lens solutions:
  ○ purpose: clean contact lenses to maintain clear vision and comfort and disinfect to minimise infection
  ○ properties: contain chemicals which may remove lipids and debris, while enhancing wettability
• anti-static cleaning cloths:
  ○ purpose: wipe away deposits, surface marks, smudges, maintain anti-reflective coatings, and to prevent scratching
  ○ properties: microfibre cloths which are non-abrasive to products
• anti-fog wipes:
  ○ purpose: prevent spectacles from fogging up, particularly when masks are worn
  ○ properties: pre-moistened wipes, containing mild traces of alcohol, which act as an evaporator
• sun clips/flip-ups:
  ○ purpose: negate the need for an extra pair of sunglasses
  ○ properties: reduce light transmission and block UV light
• ready readers:
  ○ purpose: convenient, easy to access spectacles, often used as a spare or cheap reading spectacles, or used over the top of distance only contact lenses for presbyopic contact lens wearers
  ○ properties: set power lenses with fixed centration distances; not suitable for all patients
• sunglasses:
  ○ purpose: protect from UV damage and brightness
  ○ properties: tinted with UV block; polarised sunglasses have in-built filters to block certain wavelengths
• sports eyewear:
  ○ purpose: protect the eyes and offer a more secure fit when participating in sports
  ○ properties: lenses are generally more impact-resistant and made of plastic,
	• accurately handling refunds
	
	S3.30 Identify when a patient should be directed to a clinical practitioner:
	• identifying signs and symptoms which may suggest the need for clinical attention (for example, a stye, redness or discharge, pain)
	• establishing if a prescription needs to be updated or amended (for example, where there is a change in vertex distance or the prescription is out of date)
	• recording reported symptoms (for example, using a triage form)
	• asking appropriate follow-up questions

Retail activities in Optical Care Services	
CR39 or polycarbonate; can feature wrap-around frames and larger eye sizes for increased wind sun and impact protection; some frames come with bands to hold them securely in place • prescription swimming goggles: o purpose: provide good vision in and under water, while protecting against salt, chlorine, chloramines or micro-organisms and chemicals in the water o properties: lenses are generally made of polycarbonate, with a silicone or rubber watertight seal around the eyes; can provide UV protection and are often treated with an anti-fog coating; the lenses tend to be flat form and can cause an initial sense of distortion in longsighted prescriptions • magnifiers o purpose: increase text and object sizes for more comfortable viewing o properties: use a single lens, combination of lenses, or camera systems to achieve magnification; often categorised as one of five types: ▪ spectacle magnifiers ▪ hand magnifiers ▪ stand magnifiers ▪ telescopes ▪ electronic • spectacle cords: o purpose: allows easy storage of spectacles o properties: can be made of metal or polyamide, which attach securely with rubber hoops to prevent damage to frames • eyelid care products: o purpose: reduce blepharitis o properties: anti-bacterial solutions or wipes • eye compress: o purpose: to ease pain or discomfort from dry, itchy or infected eyes o properties: an eye mask, heated or cooled, pressed directly onto the closed	

Retail activities in Optical Care Services	
eye • drops: artificial tears/lubricant/anti-allergy: o purpose: alleviate and improve symptoms (for example, dry eyes, blepharitis, allergic conjunctivitis) by protecting, nourishing and lubricating the eye o properties: can contain naturally occurring substances (for example, sodium hyaluronate) which replenish the tear film, and anti-allergy substances (such as ectoin) which help stabilise the tear film **K3.9 How to process cash and non-cash transactions, in accordance with a practice's SOPs:** • securely handling cash (for example, immediately storing cash in the till after payment is taken and checking change before giving it) • securely managing non-cash payment methods (for example, by mobile and contactless card payments) • securely taking payment over the phone • taking deposits • setting up direct debits • issuing refunds • always offering to provide a receipt **K3.10 The factors that impact on the commercial success of the optical business:** • location • opening times • availability of appointments • range of appointment times • access to latest technology • knowledgeable, well-trained staff • sufficient staff to ensure appointments are kept • excellent customer service and care	

Retail activities in Optical Care Services	
standards • quality and range of products • well-stocked and visually appealing displays • appealing environment, including: o layout o hygiene o safety o temperature o lighting o colours o finishing touches: ▪ comfortable furniture ▪ refreshments ▪ fresh flowers ▪ magazines and picture books ▪ activity area for children ▪ mirrors at a range of heights • sales and after-sales (in-practice and online) • awareness of competition • a well-defined identity, communicated through merchandising and advertising	
K3.11 How the role of the optical assistant links and contributes to the success of the business, in relation to: • key performance indicators and practice targets • sales data (for example, dispensing percentage/conversion rates, average sale order value/average transaction value) • remake percentages and errors • patient satisfaction surveys and measures • clinic growth	
K3.12 The importance of correctly managing stock levels:	

Retail activities in Optical Care Services	

• to control costs
• to ensure that all products, particularly consumables, are fit for sale:
  o within date
  o undamaged
  o correctly packaged and labelled
• to ensure sufficient supply to meet demand
• to monitor slow-moving stock
 	
K3.13 The principles of stock control in Optical Care Services:
• following practice's SOP in relation to stock control and replenishment (for example, filling in gaps in display when empty, which maintains supply of the most popular products)
• sourcing products from product logistics teams and making enquiries around stock deliveries upon request from patient
• maintaining knowledge of automatic delivery systems; point of sale (POS) systems automatically fulfil replenishments
• reconciling deliveries with stock orders to identify errors
• ensuring shelf life remaining on consumables (for example, contact lens solution) is sufficient for the product to be used before the expiry date in accordance with the practice SOPs
• applying stock rotation – ensuring consumables with nearest expiry date are stocked at front
 	
K3.14 Indications of the need for clinical attention:
• the patient presents with symptoms that are outside the optical assistant's competence or scope of practice:
  o stye
  o redness
  o discharge
  o pain
  o gradual vision change	

Retail activities in Optical Care Services	

• the patient that presents with symptoms that require urgent attention rather than an appointment:
  o flashes and floaters
  o red eye
  o sudden change or loss of vision
  o sudden onset diplopia
• the patient requires an up-to-date eye examination/contact lens check before retail products can be issued
• the patient is non-tolerant to a new prescription	

Complaints: policies and procedures	
Knowledge - What you need to teach	**Skills - What you need to teach**
The student must understand: **K3.15 The Patients Association's definition of a complaint:** • 'An expression of dissatisfaction made to an organisation, either written or spoken, and whether justified or not, which requires a response' **K3.16 The role of the Optical Consumer Complaints Service (OCCS):** • providing free, independent advice to patients with complaints • mediating disputes between optical practices and patients, except when involving allegations of negligence or concerns about fitness to practice • advising optical professionals on how to avoid or respond to complaints **K3.17 Best practice guidance for optical practices when dealing with complaints:** • having a clear complaints policy, which is	The student must be able to: **S3.31 Handle patient complaints and refunds in line with policies and procedures:** • acknowledging and recording all complaints, noting all relevant details and actions taken • referring the complaint to the colleague undertaking final responsibility **S3.32 Deal with patient complaints in a polite and courteous way, explaining procedures and policies:** • listening actively and recording information, requesting clarification where appropriate • summarising key information to ensure understanding • using language appropriate to the patient • explaining warranties and guarantees to the patient (GEC4, GEC6)

Complaints: policies and procedures	
clearly accessible to patients • having a named complaints manager • encouraging patient feedback and using this to improve services • investigating all feedback which gives cause for concern • acknowledging complaints within a defined period (for example, 3 working days) • keeping a record of all complaints, including keeping records of clinical complaints in patients' individual records • informing patients of how their personal information will be managed in relation to complaints • treating all patients fairly and without discrimination • ensuring all staff are familiar with the complaints procedure • ensuring all staff understand how to deal politely and professionally with complaints	**S3.33 Deal with patient complaints in a way that minimises the negative impact on the public view and reputation of the optical business, including negotiating a satisfactory outcome for both parties:** • listening actively and acknowledging the patient's concern/distress • asking questions for clarification • reassuring patient that the complaint will be addressed • outlining all suitable options to resolve the complaint and offering a choice of resolutions for the patient. • offering alternative resolution options (for example, referring to the designated complaints person) • confirming that the patient is satisfied with the proposed resolution (GEC6)
K3.18 The reasons a patient may wish to return products or make a complaint: • clinical reasons: missed pathology; poor vision; incorrect prescription; incorrect product supplied • service-related reasons: delayed appointments, inappropriate staff behaviours (for example, rudeness); delayed deliveries; the patient missed/was not informed about NHS entitlements • product-related reasons: dissatisfaction with the product; faulty lens/frames; frame fitting/comfort; buyer's remorse/changed mind; unhappy with outcome/style; poor manufacturing; repeated adjustments; post-collection allergic reactions	**S3.34 Issue refunds or process exchanges in line with policies and procedures:** • maintaining a courteous and polite manner • explaining refund/exchange policy • refunding/exchanging and recording the appropriate amount as instructed, through the correct payment method (for example, cash, PDQ card machine, head office cheque) • completing all paperwork while the patient is present and not amending afterwards
K3.19 Strategies to handle patient complaints within the optical environment: • adhering to company after-sales policy (for example, no quibble, no fuss policies) • adhering to the practice's mission statement	**S3.35 Identify when optical complaints need to be referred to clinical or senior colleagues:** • referring any complaints beyond the optical assistant's scope of practice: o Clinical o service-related o product-related

Complaints: policies and procedures	

• behaving in a professional manner:
  ○ listening and remaining calm
  ○ empathising
  ○ repeating back the issue to confirm understanding
  ○ establishing what the patient would like to happen
  ○ offering practical solutions
  ○ apologising, where appropriate
  ○ establishing deadlines for resolution and stick to them
• following the escalations process
• accurately documenting the complaint
 	
K3.20 The positive and negative impacts of complaints on an optical practice's overall success:
• positive impacts:
  ○ being transparent about a complaints procedure can foster trust in the practice
  ○ patients feel encouraged to give feedback and have a voice
  ○ satisfactory resolution can lead to positive word-of-mouth/reputation
  ○ complaints can be used to form lessons learnt and improve services
• negative impacts:
  ○ poorly managed complaints can lead to reputational damage through word-of-mouth, social media, press articles
  ○ justifiable escalations can result in legal prosecution and/or financial penalty
  ○ breaches of GoC standards may affect the practice's ability to operate as a business	

Occupational specialism – Assisting with Healthcare Science

Knowledge and skills are set out side-by-side within their themed sections. The numbering is sequential throughout the performance outcome, from the first knowledge statement, following on through the skills statements. The 'K' and 'S' indicate whether the statement belongs to knowledge or skills.

Mandatory content

Performance outcome 1: Contribute to patient care by supporting physiological, physical and clinical engineering services to produce reliable data and images for use by healthcare professionals in diagnosis and treatment

Performance outcome 2: Contribute to patient care by supporting the collection of a range of specimens for analysis to aid diagnosis and treatment

Performance outcome 3: Contribute to patient care by processing and analysing service user specimens in a range of life science areas and laboratory environments to produce reliable data sets for use by healthcare professionals in diagnosis and treatment

Glossary

Patient

An individual who is ill or is receiving medical treatment for a disease or underlying condition from a doctor or hospital. The patient will be registered with a particular doctor, such as a general practitioner (GP) or medical consultant.

Service user

The healthcare science sector offers a wide range of clinical and diagnostic healthcare services. A service user can denote a variety of individuals who may access these services, including patients, medical clinicians, NHS Trust providers, GP surgeries, commissioners, community practitioners and referral centres and private/independent companies.

Scope of practice

Sets out the limits of responsibility and ensures individuals do not undertake work outside of training or competence.

Scope of role

Range of activities, duties or responsibilities that an employee is reasonably expected to carry out or fulfil within the ambit of their job or position.

Performance outcome 1: Contribute to patient care by supporting physiological, physical and clinical engineering services to produce reliable data and images for use by healthcare professionals in diagnosis and treatment

Job roles, disciplines and divisions in physiological, physical and clinical engineering services	
Knowledge – what you need to teach	**Skills – what you need to teach**
The student must understand: **K1.1 The responsibilities and duties of the job role of a healthcare science assistant (HCSA) when supporting the collection of clinical measurements:** • following standard operating procedures (SOPs) • infection prevention and control • providing explanations and communicating in a way that puts patients at ease • communicating the purpose of the tests • confirming patient consent • explaining the risks and mitigating steps (for example, radiation) • calibration/verification of basic equipment • carrying out a broad range of tasks under relevant supervision: o ensuring equipment is fit for use o checking leads for electrocardiogram (ECG) machines o monitoring blood pressure through non-invasive methods o preparing equipment for use: ▪ collecting appropriate mouth pieces for peak expiratory flow (PEF) ▪ checking patient giving sets o operating medical equipment: ▪ thermometry ▪ non-invasive blood pressure measurement ▪ peripheral capillary oxygen saturation o prepare the patient: ▪ checking arm in preparation for blood	The student must be able to: **S1.52 Apply knowledge of roles and responsibilities to provide the best patient care when supporting the physiological, physical and clinical engineering services to produce reliable data and images for use by healthcare professionals in diagnosis and treatment:** • supporting the healthcare science professional • carrying out a broad range of tasks: o PEF o spirometry o ECG o blood pressure • following SOPs: o infection control o preparing appropriate equipment o ensuring equipment is fit for use • communicating effectively with patients: o explaining things in a way that puts patients at ease: ▪ communicating the purpose of the tests ▪ explaining risks to patient if asked ▪ conveying technical information using appropriate language • applying knowledge of technical expertise • applying knowledge of skills proficiency of the clinical engineering services across a reasonable range of commonly used devices in order to operate effectively within digitised contexts (GEC1, GDC1, GDC4)

Job roles, disciplines and divisions in physiological, physical and clinical engineering services	
pressure measurement ▪ checking for jewellery and nail polish on patient • supporting the healthcare science professional • collecting and inputting data: o use of National Early Warning Score (NEWS) charts • forwarding patient results to clinician for their interpretation • recognising when to escalate: o incidents o patient concerns o governance issues **K1.2 The functions of divisions and disciplines within physiological and physical sciences:** • physiological sciences: o cardiac physiology o neurophysiology o respiratory physiology o audiology o sleep science o gastrointestinal (GI) o urodynamic o ophthalmic vision science • medical physics and clinical engineering: o diagnostic radiology o radiotherapy engineering o radiotherapy physics o ultrasound o nuclear medicine o magnetic resonance (MR) physics o rehabilitation/prosthetics o bio mechanical engineering **K1.3 The definitions of scope of practice, fitness to practise and continuing professional development:** • scope of practice: understanding of limits of responsibility and not undertaking work	**S1.53 Apply understanding of the scope of practice in these specific areas to ensure effective patient care:** • not undertaking work outside of competence • selecting different sources to gather information, to understand the scope of practice • reading, interpreting and synthesising information to specific areas to ensure effective patient care (GEC5) **S1.54 Contribute to research and innovation within the boundaries of relevant clinical and scientific practice as required:** • support the healthcare science professional • carry out a broad range of tasks under supervision • follow regulatory framework • record data • take observations during research • listen actively to contributions of others to support research and innovation • make relevant and constructive contributions to move discussion forward: o organise ideas logically and coherently o speak clearly and confidently using appropriate tone and register, reflecting audience and purpose • recognise the difference between fact and opinion • recognise bias to enable work within the boundaries of clinical and scientific practice • contribute to the drafting of standard technical documents using precise terminology and agreed formats depending upon local practice • request clarification where appropriate to support research and innovation • use technology as appropriate to carry out the systematic collection, processing and organisation of data to support research

Job roles, disciplines and divisions in physiological, physical and clinical engineering services	
outside of training or competence • fitness to practise: understanding of own physical/mental state and capacity to work • continuing professional development (CPD): holistic commitment of professionals towards the enhancement of personal skills and proficiency throughout their careers **K1.4 The role of CPD in order to develop professional practice and support continuous improvement:** • improving patient care: o use of new technologies such as ambulatory blood pressure monitors • supporting career progression • maintaining up-to-date practice: o new techniques when taking clinical measurements • reacting to needs of workforce **K1.5 The techniques within self-reflection and evaluation, including the use of tools and opportunities for undertaking reflective practice:** • reflecting upon specific experiences and situations when collecting clinical measurements: o working with disabilities, escalated situations • principle stages of Kolb and Gibbs reflective cycles • engaging in self-reflection opportunities (for example, 1:1s, team meetings, workshops) **K1.6 The purpose of the NHS leadership model and its implications in terms of scope of practice:** • created for those working in healthcare to assist them to think about their own behaviour • outlines the key attitudes and behaviours of leaders in the healthcare workplace • everyone can be a leader within the leadership model	and innovation (GEC1, GEC2, GEC3, GEC4, GEC5, GEC6) **S1.55 Recognise the need to refer, and make referrals of patients, to a senior member of the healthcare team:** • recognise when a task is outside of their scope of practice • recognise when to escalate concerns: o faulty equipment o medical emergencies • give explanations to other members of the healthcare team, both orally and in writing, in a clear and unambiguous way to make appropriate referrals • use technical language correctly, using graphics and other tools to aid referral • speak clearly and confidently using appropriate tone and register that reflects audience and purpose • select key information from written text/oral discussions to recognise the need to refer and summarise concisely (orally or in writing) in style appropriate to audience and purpose (GEC1, GEC2, GEC4)

Job roles, disciplines and divisions in physiological, physical and clinical engineering services	

K1.7 The purpose of a range of services within healthcare science that contribute to patient care, to investigate, diagnose and treat disease:
• physiological services:
  ○ blood pressure testing
  ○ spirometry
  ○ peak expiratory flow (PEF)
  ○ electrocardiogram (ECG)
  ○ electroencephalogram (EEG)
  ○ endoscopy
• physical services:
  ○ X-ray
  ○ magnetic resonance imaging (MRI)
  ○ ultrasound
  ○ nuclear medicine imaging
  ○ nuclear medicine therapy
  ○ radiotherapy
• clinical engineering and clinical measurement:
  ○ rehabilitative engineering
  ○ urodynamics
  ○ intracranial pressure monitoring
  ○ spinal cord monitoring
K1.8 Responsibilities of a range of roles within a multi-disciplinary team within the collection of clinical measurements:
• healthcare science assistant/lab assistant:
  ○ preparing measurement equipment
  ○ preparing patients
  ○ preparing datasheets
  ○ preparing specimen receptacles
  ○ taking some measurements:
  ▪ recording results
• healthcare science associate practitioners:
  ○ taking measurements
  ○ completing datasheets	

Job roles, disciplines and divisions in physiological, physical and clinical engineering services	

• healthcare/medical scientist:
  o interpreting measurement results
  o data quality assurance
K1.9 There are certain activities which can only be completed by registered professionals:
• diagnosis (assistants may take blood pressure, would not diagnose)
• prescribing (assistants would not prescribe)
• screening (assistants can take samples as part of the screening process)
• may be able to issue results, as long as it is within the scope of practice
• imaging (only radiographers and nuclear medicine practitioners would acquire images)
K1.10 The purpose of research and innovation in healthcare science:
• research:
  o to enable more to be learnt about the causes of disease and illness
  o prevention and treatment of disease
  o improving healthcare practice
• innovation:
  o solutions to healthcare problems, reached through the outcomes of research
  o continuous improvements to existing products, including devices, and procedures
K1.11 The importance of adhering to the regulatory framework within which research and innovation is conducted by the Health Research Authority (HRA) and Medicines and Healthcare products Regulatory Agency (MHRA):
• ensuring good clinical practice
• minimising risks
• ensuring research is carried out following ethical principles:
  o ensuring informed consent
  o ensuring participants are informed about	

Job roles, disciplines and divisions in physiological, physical and clinical engineering services	
the risks ○ safeguarding participants ○ protecting participants' confidentiality and anonymity • ensuring validity of research carried out • not following these guidelines can result in invalidating studies and potential harm to patients **K1.12 How the role of a healthcare science assistant may contribute to research and innovation within the collection of clinical measurements:** • healthcare science assistant may take observations during research • use a computer to record results of research in compliance with research project • take clinical measurements • take measurements on newer equipment and compare with older equipment • discuss clinical measurements with senior colleagues **K1.13 How quality assurance, management and improvement links to their associated standards and accreditation bodies:** • quality assurance: ○ United Kingdom Accreditation Service (UKAS) ○ Improving Quality in Physiological Services (IQIPS) ○ Academy for Healthcare Science (AHCS) • quality management: ○ International Organization for Standardization (ISO) • quality improvement: ○ Care Quality Commission (CQC) **K1.14 The purpose of associated accreditation bodies within healthcare science:** • confirms the department has the facilities to adhere to quality standards • confirms the department has the governance to adhere to quality standards	

Job roles, disciplines and divisions in physiological, physical and clinical engineering services	
• confirms the department has the correct personnel to adhere to quality standards **K1.15 The responsibilities of the healthcare science assistant (HCSA) in quality assurance, management and improvement:** • HCSA must adhere to quality processes • HCSA involvement with audit cycle work **K1.16 Factors that would dictate the need to seek support and advice from clinical colleagues:** • faulty equipment (for example, X-ray equipment, non-invasive blood pressure metre, ECG, spirometer) • medical emergencies • patient is non-responsive • patient is in unusual pain or discomfort • sudden onset of new symptoms • difficult or challenging patient behaviour • patient characteristics and ability to obtain mental capacity • communication barriers • pre-existing medical condition making it technically challenging to take the measurement • considerations in respect of sexuality, culture and religion (for example, making sure client is comfortable with scans) • unexpected/unusual test results	

Human anatomy and physiology	
The student must understand: **K1.17 How knowledge of human anatomy and physiology relates to the methods used for the collection of clinical measurement data:** • pulse oximeter: o oxygenated blood and deoxygenated blood	The student must be able to: **S1.56 Apply knowledge of anatomy and physiology to the collecting of clinical measurement data:** • demonstrate the ability to take factors into account which impact normal physiological measurements while collecting and examining measurements:

Human anatomy and physiology	

• non-invasive blood pressure:
  ○ systolic, diastolic and cardiac cycle
  ○ location of brachial artery and radial pulse
• electrocardiogram (ECG):
  ○ electrical activity of the heart
• electroencephalogram (EEG):
  ○ electrical activity of the brain
• spirometry:
  ○ airway obstructions
  ○ speed and volume of air
  ○ forced expired volume in 1 second
  ○ forced vital capacity
• peak expiratory flow (PEF):
  ○ airflow obstructions
  ○ diurnal variation
• X-ray:
  ○ anatomy including bones and lungs
• MRI:
  ○ anatomy of soft tissue
• ultrasound:
  ○ speed and direction of blood flow
  ○ anatomy of joints
• nuclear medicine:
  ○ uptake of (ingestion or injection) radioactive substances in order to examine the physiological process of disease, healthy function or over/under function of organs and/or systems
K1.18 The importance of assessing physiological measurements against specific normal expected ranges:
• confirms accurate measurements against external factors
• to be able to assess accurately the health status and body functions of an individual
• to be able to provide information on extent of disease or disability
• to monitor trends and changes in physiology
	○ age
	○ sex
	○ medication
	○ long periods of inactivity
	○ diets
	• apply knowledge of anatomy and physiology to collect and generate relevant clinical measurement data:
	  ○ demonstrates correct and accurate recording within NEWS charts
	• consider upper and lower bound of measurement data
	• recognise measurement results where direct proportionality and inverse proportionality occur
	• demonstrate an understanding of the accuracy and precision that is required in collecting clinical measurements
	• use knowledge of anatomy and physiology in context to measure:
	  ○ blood pressure:
	  ▪ locate the radial pulse
	  ▪ ensure lower edge of the cuff is placed 2 to 3cm above the brachial artery
	  ○ electrical activity of the heart:
	  ▪ ensure correct placement of electrodes
	  ○ lung capacity, airway obstructions, speed and volume of air:
	  ▪ ensure correct patient demographics (for example, height, weight, sex)
	• use specialist notational/representation to reflect clinical standard practice
	• demonstrate an understanding that data processing procedures and outputs should be interrogated and interpreted critically against anatomy and physiology knowledge
	• understand and synthesise information regarding anatomy and physiology to support the collection of clinical measurements
	• provide supporting documentation in

Human anatomy and physiology	
K1.19 How factors can impact on normal physiological measurement values: • age (for example, efficiency of thermoregulation is reduced by the physiological changes of aging) • sex (for example, female service users experience greater temperature changes than males due to hormonal differences, and males usually have higher blood pressure than females of the same age) • ethnicity (for example, African Americans have a greater resting heart rate compared to European Americans) • geography (for example, high altitude may lead to changes in oxygenation level) • particular medical conditions (for example, type 1 and type 2 diabetes) • medication (for example, can directly alter pulse, respirations or blood pressure; digitalis preparations can decrease pulse rate) • genetic predisposition (for example, some Jewish groups can have elevated blood cholesterol levels due to a single gene) • long periods of inactivity (for example, deep vein thrombosis caused by long haul flights) • diet (for example, eating a large meal prior to blood pressure measurement) • psychological (for example, white coat hypertension is the phenomenon in which people exhibit a blood pressure higher than their normal range in a clinical setting) • substances (for example, tobacco may affect lung function)	different formats (for example, clinical observation charts) • ask and respond to questions for clarification around knowledge of anatomy and physiology • demonstrate technical expertise, understanding and skills proficiency across a reasonable range of commonly used devices in order to operate effectively within digitised contexts (GEC2, GEC5, GEC6, GMC1, GMC2, GMC3, GMC5, GMC6, GDC1)

Equipment and devices used to take clinical measurements to support physiological, physical and clinical engineering services	
The student must understand: **K1.20 The underpinning scientific principles of equipment and devices used for a range of common tests:**	The student must be able to: **S1.57 Apply knowledge of relevant science concepts when supporting the collection of clinical measurements:**

Equipment and devices used to take clinical measurements to support physiological, physical and clinical engineering services	

• blood pressure monitoring:
  ○ equipment:
  ▪ sphygmomanometer
  ▪ stethoscope
  ▪ blood pressure cuff
  ○ the inflation and release of the cuff restricts and releases the blood flow; the pressure is measured by the sphygmomanometer
  ○ the sounds listened to by the stethoscope allow systolic and diastolic pressure readings to be noted
  ○ accurate recording of systolic and diastolic pressures on the National Early Warning Score (NEWS) chart
• electrocardiogram (ECG) recordings:
  ○ equipment:
  ▪ ECG recording machine
  ○ this measures heart activity over time by measuring electrical potentials and using transducers which convert these potentials into an electron current that can be represented on an ECG trace
• peak expiratory flow (PEF):
  ○ equipment:
  ▪ PEF meter
  ○ the PEF meter measures the speed of air flow in litres/millilitres per second
• spirometry:
  ○ equipment
  ▪ spirometer
  ○ spirometers convert volume to flow and vice versa, depending on the type of equipment used
• medical X-rays:
  ○ equipment:
  ▪ X-ray tube
  ○ X-rays penetrate the body with some being blocked by structures in the body; X-rays which penetrate through body are detected on the other side and form
	• support the practitioner in the collection of clinical measurement data
	• take blood pressure:
	  ○ ensure blood pressure cuff is appropriately inflated:
	  ▪ inflate using the bulb
	  ▪ inflate cuff by a further 20 mmHg when the pulse is no longer felt
	  ○ deflate the cuff, noting the point in which pulse is detectable (systolic) and when pulse disappears (diastolic)
	  ○ demonstrate correct use of stethoscope
	• perform electrocardiogram (ECG):
	  ○ ensure good contact between skin and electrodes while taking ECGs
	• perform spirometry:
	  ○ make sure patient has performed a correct seal around the mouthpiece
	  ○ ensure patients are seated
	• perform peak expiratory flow (PEF):
	  ○ make sure patient has formed a correct seal and blown into tube correctly while using PEF
	  ○ ensure patients are seated
	  ○ make sure patient is not covering the dial with their hand or fingers while using PEF
	• identify errors in application of clinical measurement test
	• demonstrate the ability to understand the language of digital devices and technologies which are used when collecting measurements
	• demonstrate technical expertise, understanding and skills proficiency across a reasonable range of commonly used devices in order to operate effectively within digitised contexts
	• demonstrate an understanding of the accuracy and precision that is required in collecting clinical measurements in accordance with science concepts
	• use knowledge of science concepts in context to find appropriate safe methods in

Equipment and devices used to take clinical measurements to support physiological, physical and clinical engineering services

an image

- computed tomography (CT) scans:
  - equipment:
    - CT scanner
  - combines data from a series of X-rays to produce detailed cross-sectional images of the body
- magnetic resonance imaging (MRI):
  - equipment:
    - MRI scanner
  - these devices make use of strong magnetic fields, magnetic field gradients and radio waves to generate images
- ultrasound:
  - equipment:
    - ultrasound machine
  - ultrasound creates images via high frequency sound pulses that are transmitted into the body; the soundwaves travel until they hit a boundary within the body and reflect back, enabling the creation of an image

K1.21 The advantages and disadvantages of CT scans compared to conventional X-ray image:

- advantages:
  - produces 3D scan
  - can produce image of bones, soft tissues and blood vessels at the same time
- disadvantages:
  - more radiation than standard X-ray
  - more expensive
  - takes longer than conventional X-ray
  - inappropriate for people with kidney problems due to use of contrast dye
  - can be difficult to complete for patients with tremors and shakes
  - requires breath holding
  - side effects on contrast dyes

K1.22 The advantages and disadvantages of an

the collection of clinical measurements

- ask and respond to questions for clarification around knowledge of science concepts
- use mathematical processes (calculations, diagrams and data representations) to support the collection of clinical measurements

(GEC6, GMC1, GMC2, GMC8, GDC1, GDC6)

S1.58 Select appropriate equipment and accessories and/or devices for measurements to be collected:

- gather equipment outlined in SOPs
- identify the measurement data required
- demonstrate a secure level of competence and confidence in the use of digital devices and media which allows them to select, configure and use relevant technology and media functions effectively
- demonstrate an understanding of the accuracy or precision that is required in measurement collection to select appropriate equipment

(GMC1, GMC5, GDC1)

S1.59 Apply knowledge of the underpinning principles of the use of equipment and devices used to take clinical measurements in order to ensure that accurate measurements and images are obtained:

- detect equipment wear and tear:
  - kinks and damage to hoses
- splits in cables:
  - ECG gel build up
- use appropriately sized equipment:
  - correct sized blood pressure cuff
  - pulse oximeter
- take appropriate precautions when working with imaging techniques
- demonstrate technical expertise, understanding and skills proficiency across a reasonable range of commonly used devices in order to operate effectively within

Equipment and devices used to take clinical measurements to support physiological, physical and clinical engineering services	

ultrasound:
• advantages:
  ○ no harmful radiation
  ○ portable
  ○ can be used to measure tissue viability
  ○ painless
  ○ cheaper than X-ray and CT
  ○ can be used to assess organs
• disadvantages:
  ○ large amount of artefacts
  ○ limited resolution
  ○ cannot see bone structures
  ○ prone to damage
K1.23 The characteristics of radiopharmaceuticals:
• medicinal formulations consisting of radioisotopes
• used to diagnose and treat disease
K1.24 The methods of administering radiopharmaceuticals to patients:
• mouth
• injection
K1.25 The functions of a gamma camera and how it generates images:
• a gamma camera detects gamma ray flashes that are emitted from a radioactive marker (inside the patient). A crystal inside the gamma camera generates 'scintillations' which are detected by photomultipliers
• light from flashes is picked up by photomultipliers situated behind the crystal
• electrical output from photomultipliers is fed into a computer to produce the image
• a gamma camera allows images to be taken of an organ or disease using radio tracers that are selected based on their ability to localise in specific organs using SPECT-CT techniques
	digitised contexts
	• identify issues concerning the calibrations of equipment
	• apply knowledge of technology as appropriate to carry out accurate measurements and images to be obtained
	• use of software to produce collection of measurements and images, including diagrams, graphs and charts, that best communicate information to intended audiences and reflect 'clinical standard' practice
	• understand that graphical data may require the identification and validation (using technology) of mathematical functions to appropriately model the data
	• a secure level of competence and confidence in the use of digital devices which allows them to select, configure and use equipment in the collection of accurate measurements and images
	(GMC1, GMC5, GMC6, GDC1)

Principles and practice of equipment management used for the collection of clinical measurements

The student must understand:

K1.26 The importance of equipment being calibrated correctly:

- correct calibration improves accuracy of results
- incorrect calibration can result in false negative/positive results
- incorrect calibration can result in incorrect treatment
- prolonging the life of equipment
- meeting legal requirements

K1.27 When calibration may be required:

- annual calibration of all equipment as a minimum
- frequent calibration for high risk equipment:
  - baby scales
  - point of care testing (POCT) devices
- frequent calibration for sensitive equipment:
  - automatic blood pressure device
- power outages lead to a need for calibration for some equipment:
  - blood pressure monitors if recharging
  - ECG monitors

K1.28 Stages of calibrating a range of equipment which requires frequent calibration:

- scales:
  - confirm scales are set at zero (tare) before use
- height bar:
  - perpendicular to floor
  - floor is level
- automatic blood pressure device:
  - run self-check whenever it is turned on
  - check battery level
- peak expiratory flow (PEF):
  - set to zero after every breath
  - perform biological control

The student must be able to:

S1.60 Undertake calibration of equipment that is within scope of practice:

- can calibrate equipment:
  - scales
  - spirometer
  - automatic blood pressure device
- collect and generate data required for calibration
- apply skills with confidence and fluency to solve technical problems with calibration
- identify issues concerning the calibrations of equipment
- demonstrate technical expertise, understanding and skills proficiency across a reasonable range of commonly used devices in order to operate effectively within digitised contexts

(GMC1, GMC2, GMC5, GDC1)

S1.61 Raise concerns about equipment if found that the equipment is out of date:

- noting PAT stickers out of date
- raising concerns with a senior practitioner
- checking service labels
- identifying issues concerning the dates on the equipment
- following key information from written text/oral discussions and responding accordingly

(GEC4, GMC1)

S1.62 Ensure equipment is fit for use before using it with patients:

- checking equipment is fit for use:
  - checking leads and sensors on an ECG machine prior to use
- making sure equipment is calibrated
- noticing issues with hardware, such as wear and tear
- raising any concerns with senior practitioner

Principles and practice of equipment management used for the collection of clinical measurements

- spirometer:
  - establish room temperature and humidity
  - perform volume verification/calibration with a syringe (1 or 3 litre)
  - perform biological control
- temperature check:
  - run self-check whenever it is turned on
  - check battery level

K1.29 The importance of maintaining equipment effectively when collecting measurements and images from patients:

- increases longevity of equipment
- ensures equipment is always fit for use
- enables early identification of issues with equipment
- makes sure equipment is electrically safe for patients and user:
  - portable appliance testing (PAT)
- makes sure equipment is operationally safe:
  - confirming calibration
  - alarm functionality
- prevents incorrect results causing incorrect treatment
- prevents the potential for resulting fines, reputational damage and legal action
- decreases chances of infection and cross-contamination

K1.30 The importance of adhering to maintenance schedules for complex equipment such as X-ray machinery:

- confirms formalised process of maintenance, limiting risks of complex equipment
- confirms software updates are completed
- forward planning for external companies to complete maintenance (for example, service level agreements)
- ensures excess radiation is not released

K1.31 How to address issues with equipment that is not fit for use:

- notice general wear and tear on equipment:
- identifying issues concerning equipment before using on patients
- following key information from written text/oral discussions and responding accordingly
- applying routine skills with confidence and fluency to solve technical problems

(GEC4, GMC1, GMC2)

S1.63 Use single or multiple-use equipment as appropriate for the measurement being taken in accordance with SOPs and to ensure health and welfare of the patient:

- identify appropriate single and multiple-use equipment
- change consumables:
  - PEF mouthpiece
  - spirometer mouthpiece/bacterial filter and nose clips
  - thermometer tips
  - recording charts
  - ECG printing paper
  - ECG electrodes
- follow SOPs regarding frequency of equipment changes
- ask and respond to questions for clarification

(GEC6)

Principles and practice of equipment management used for the collection of clinical measurements	
○ ECG case cracks ○ split power cords ○ degraded flow sensors • follow local policy (for example, managing medical equipment policy) • quarantine equipment and associated accessories (for example, infusion pumps and giving sets) • escalate immediately to relevant department/manager • record in accident/near miss book if necessary **K1.32 How to handle hazardous materials and substances with reference to COSHH and health and safety policies:** • bodily fluids: ○ collect and place down the sluice for disposal ○ place into specimen containers for testing • blood: ○ clean surface in line with local protocol ○ place blood and associated disposables into incinerator bag for disposal • radioactive substance: ○ need to be licensed to work with • clinical waste: ○ infectious waste contaminated with pharmaceuticals (not cytotoxic) disposed of in yellow bags ○ infectious waste not contaminated with pharmaceuticals are disposed of in orange bags ○ includes single-use items: ▪ disposables gloves ▪ aprons ▪ anything from tray ▪ bed rolls • sharps: ○ rigid sharps box used for needles, scissors, syringes, scalpel blades and slides	

Principles and practice of equipment management used for the collection of clinical measurements	
○ box is locked after use ○ taken away to be recycled or incinerated • drugs/chemicals: ○ department has a list of allowed drugs and chemicals ○ returned to pharmacy for disposal **K1.33 Principles of the categories of risk:** • low risk (for example, blood pressure cuff, ECG electrodes, PEF device, scales): ○ contact with unbroken skin ○ low potential for infection and cross-contamination • high risk (for example, endoscope, gastroscopes): ○ invasive equipment ○ usually high tensile steels or cameras ○ high potential for infection and cross-contamination (for example, potential aerosol generating procedure (AGP)) **K1.34 The decontamination processes for high and low risk equipment and devices aligned to infection control policies:** • low risk: ○ cleaned with appropriate disinfectant • high risk: ○ will need to be sterilised ○ can be autoclaved or decontaminated with formaldehyde **K1.35 The difference between single-use and multiple-use equipment:** • single-use equipment (for example, PEF mouthpiece, thermometer tips, ECG adhesion pads): ○ used once and immediately disposed of via appropriate waste stream ○ utilised to avoid cross-contamination • multiple-use equipment (for example, blood pressure cuffs, ultrasound probes): ○ used more than once but appropriate decontamination procedures must be followed after every use	

Techniques used to support patient care when collecting clinical measurements and images

The student must understand:

K1.36 How person-centred care is applied within healthcare science where clinical measurements are being collected:

- explaining clinical measurement procedures to patient before taking the measurement
- confirming consent with patient:
  - confirming consent to touch patient prior to taking blood pressure
  - confirming consent before moving and removing clothing
- checking if a chaperone is required
- speaking to the patient to put them at ease
- explaining clinical procedures to patient in a way in which the patient can collect this measurement themselves:
  - PEF
  - spirometry
  - blood pressure
  - pulse oximetry
- creating patient care plan with focus on when the patient should take and record their own clinical measurements
- focusing patient care plan on the patient and maximising comfort and convenience:
  - providing equipment to complete measurements at home

K1.37 The methods used to collect clinical measurements:

- height:
  - height chart
- weight:
  - scales
  - body mass index (BMI) calculation
- blood pressure:
  - sphygmomanometer
  - manual vs automated
- heart trace:

The student must be able to:

S1.64 Provide person-centred care in respect of collecting all data and images:

- demonstrate empathy to patient when appropriate
- speak to the patient to put them at ease
- use technical language correctly when explaining the following clinical measurement procedures:
  - blood pressure test
  - PEF
  - spirometry
  - ECG
  - pulse oximetry
- show patients how to take the following clinical measurements themselves:
  - blood pressure
  - PEF
  - spirometry
  - pulse oximetry
- respond to patient questions
- listen actively to contributions of the patient
- show patient how to record clinical measurement data
- listen actively and record information accurately and concisely
- speak clearly and confidently using appropriate tone and register that reflects audience and purpose to provide person-centred care

(GEC1, GEC2, GEC4, GEC6)

S1.65 Promote health and wellbeing, both physical and mental, at all times when working with patients:

- encouraging patients to take their own measurements when required/necessary
- providing guidance on when to seek support

Techniques used to support patient care when collecting clinical measurements and images

- 12 lead ECG
- respiratory function:
  - spirometry
  - PEF
- blood oxygenation:
  - pulse oximeter

K1.38 Appropriate techniques for taking required measurements from patients, considering a range of personal factors:

- blood pressure test:
  - blood pressure cuff size varies for age and size of patient
  - some blood pressure devices cannot be used on children
  - lower cuff pressure for frail adults and children
- peak expiratory flow (PEF):
  - size of mouthpieces differs on age and size of patient
  - different device required depending on age (for example, different ranges)
  - patient demographics (height, weight, age, sex)
- spirometry:
  - size of mouthpieces differs on age and size of patient
  - patient demographics (height, weight, age, sex)
- pulse oximeter:
  - use of different probes dependent on age of patient (for example, neonatal, paediatric, adult)
  - use of different types of sensor dependent on frailty of patient (for example, ear, finger, toe)
- weight measurement:
  - use of different scales dependent on size of patient
- height chart:
  - use of different height marker dependent on age and size of patient

- making sure patient is in a healthy state
- encouraging patients to continue taking correct medications
- encouraging healthy lifestyle
- encouraging contributions from patients and supporting these with relevant and persuasive arguments
- selecting different sources to gather information to promote health and wellbeing
- demonstrating an understanding of the nature, type, quality and reliability of information
- giving explanations to patients, both orally and in writing, in a clear and unambiguous way, taking into account the level and experience of the audience (for example, explaining technical information to a non-technical patient; influencing their choice of options)

(GEC1, GEC5, GEC6, GDC5)

S1.66 Apply consent procedures when collecting clinical measurements:

- check 3 forms of identification criteria (for example, date of birth, first line of address, name)
- confirm consent before clinical measurements are taken:
  - confirming consent before touching patient
  - moving clothing to take blood pressure
- ask if chaperone is required
- listen actively and record information accurately and concisely
- ask and respond to questions for clarification
- speak clearly and confidently using appropriate tone and register that reflects audience and purpose for gaining consent

(GEC2, GEC4, GEC6)

Techniques used to support patient care when collecting clinical measurements and images	
K1.39 The importance of adhering to good clinical and scientific practice: • ensuring measurements are taken ethically and with full consent • minimal harm is caused to the patient • measurements are taken reliably • accurate information can be communicated to other healthcare professionals **K1.40 The contraindications and other considerations associated with clinical measurement techniques:** • blood pressure test: o contraindications: ▪ absence of pulse or blood flow on one side of the body ▪ fistulas o considerations: ▪ hypertension ▪ arterial/venous cannula ▪ fistulas ▪ poor communication ▪ arrhythmia ▪ paresis ▪ limb lymphedema ▪ communication barriers (for example, language, autism, deafness) • peak expiratory flow (PEF)/spirometry: o contraindications: ▪ any abdominal, thoracic or head/eye surgery in the last 6 weeks ▪ heart attack or stroke in the last 6 weeks ▪ any known aneurysms ▪ recent nausea or vomiting ▪ any recent eye injections ▪ known pulmonary aneurysm ▪ hemoptysis (of unexplained cause)	**S1.67 Gather information to support the safe and appropriate collection of measurement data and images, through questioning, listening to and observing patients and/or carers:** • speak to patient about possible contraindications • identify signs of contraindications • communicate appropriately to patient or appropriate carer • read patient records relevant to the clinical measurement • use key information from written text/oral discussions and observations to summarise concisely (orally or in writing) in style appropriate to collection of measurement data • listen actively and record information accurately and concisely • select different sources to gather information to support safe and appropriate collection of measurement data (GEC4, GEC5) **S1.68 Obtain reliable data and images using appropriate techniques, following SOPs:** • follow appropriate SOPs • take blood pressure using automated methods • take a peak expiratory flow (PEF) measurement • perform spirometry • take pulse oxygenation measurement using pulse oximeter • take electrocardiogram (ECG) measurement • support practitioner in the obtaining of reliable data • demonstrate an understanding of the nature, type and quality of the SOPs • develop the skills, tools and platforms which enable them to design, create and amend high quality outcomes to

Techniques used to support patient care when collecting clinical measurements and images	
▪ recent pneumothorax ▪ tuberculosis (TB) o considerations: ▪ bronchoconstriction on repeated efforts ▪ dementia or comprehension impairment ▪ communication barriers (for example, language, autism, deafness) • pulse oximeter: o considerations: ▪ acrylic nails (for example, dark nail polish) ▪ hypoxia ▪ skin pigment colour ▪ poor circulation ▪ communication barriers (for example, language, autism, deafness) • weight measurement: o contraindication: ▪ ability to stand o consideration: ▪ morbid obesity ▪ communication barriers (for example, language, autism, deafness) • height chart: o contraindications: ▪ ability to stand o considerations: ▪ spinal deformities (for example, may be required to measure arm-span) ▪ appropriate attire (for example, footwear)	obtain reliable data and images • demonstrate an understanding of how data is generated, sifted, selected (sampled) and organised • use technology as appropriate to carry out systematic collection of data (GMC5, GMC6, GDC2, GDC5) **S1.69 Apply good clinical and scientific practice when undertaking all activities in respect of collecting measurement data and images:** • demonstrate professional practice • follow SOPs without deviation • understand how data is generated, sifted, selected (sampled) and organised • understand how data is presented by using a range of visual/graphical displays • understand that graphical data may require the identification and validation (using technology) of mathematical functions to appropriately model the data (GMC6)

Health, safety, regulation, legislation, local and national policies and standards when assisting with healthcare science in physiological, physical and clinical engineering services	
The student must understand:	The student must be able to:
K1.41 How underpinning knowledge of health, safety, regulation, legislation, local and national	**S1.70 Adhere to all required health and safety regulations while taking clinical**

Health, safety, regulation, legislation, local and national policies and standards when assisting with healthcare science in physiological, physical and clinical engineering services

policies and standards relates to the collection of clinical measurements and images:

- Data Protection Act 2018:
  - healthcare science assistant (HCSA) can only share measurement results with appropriate individuals
  - HCSA uses hospital number for patients instead of identifiable information
- Health and Safety at Work etc. Act 1974:
  - HCSA must use appropriate PPE
  - risk assessments must be completed on clinical measurement techniques and workspace, to ensure patient and worker safety
  - if patient takes measurements at home, risk assessments should be taken of the home environment
  - risk assessments should be completed on patient requirements and needs
- Manual Handling Operations Regulations (MHOR) 1992 (as amended):
  - manual handling of patient must be completed correctly
  - ensuring patient is in correct position for clinical measurements to be carried out
  - manual handling of clinical measurement equipment must be completed correctly and by appropriately trained personnel
  - stock control handling carried out using these regulations
- Control of Substances Hazardous to Health (COSHH) 1994 and subsequent amendments 2002:
  - risk assessment of all hazardous substances must be completed
  - substances must be handled and disposed of according to guidelines
- Medical Device Regulation 2017:
  - confirms medical devices are appropriately CE (Conformitè Europëenne) marked
  - confirms clinical measurement equipment has been serviced appropriately
  - can only use clinical measurement

measurements from patients:

- following local guidelines relating to health, safety and hygiene
- replacing consumables appropriately when taking clinical measurements:
  - PEF
  - spirometry
  - blood pressure
  - ECG
- disposing of clinical waste correctly
- using appropriate PPE at all times
- selecting different sources to gather information relating to health and safety regulations
- reading, understanding and synthesising information in accordance with health and safety regulations
- using technology as appropriate to carry out systematic collection of data

(GEC5, GMC5)

S1.71 Adhere to all local and national policies and legislation when taking clinical measurements from patients:

- only sharing data with relevant people
- following COSHH regulations
- following medical device regulations
- selecting different sources to gather information regarding health and safety regulations
- reading, understanding and synthesising information in accordance with health and safety regulations
- demonstrating their understanding of digital rights and responsibilities and current practices relating to data collection and use

(GEC5, GDC5)

S1.72 Undertake risk assessments based on patient characteristics and needs:

- noticing patient needs (for example, patient has communication needs and

Health, safety, regulation, legislation, local and national policies and standards when assisting with healthcare science in physiological, physical and clinical engineering services

equipment when appropriately trained
    - appropriate clinical measurement equipment must be disposed of appropriately
    - clinical measurement equipment must be stored appropriately
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013:
    - reporting near misses and accidents when using measurement equipment
    - reporting unsuitable environments
    - appropriate reporting of emergencies (for example, breaks, cracks, contraindications)

K1.42 The purpose of specific regulations for specialised environments and supporting health professionals in using specialist equipment:

- Ionising Radiations Regulations 2017:
    - forms the main legal requirements for the use and control of ionising radiation
- Ionising Radiation (Medical Exposure) Regulations 2017:
    - provides safeguards for individuals exposed to ionising radiation from medical equipment for imaging, treatment or research purposes

someone speaks for them)
- noticing patient characteristics (for example, patient has a physical or mental disability which may impact the taking of clinical measurements)
- understanding and synthesising characteristics of the patient
- expressing patient needs and supporting these with relevant and persuasive arguments

(GEC5, GEC6)

S1.73 Move and position equipment and people in accordance with all manual handling requirements in relation to the below measurements:

- peak expiratory flow (PEF)/spirometry:
    - asking patient to sit upright with their feet flat on the floor
- blood pressure:
    - asking patient to prepare arms for blood pressure measurement
- electrocardiogram (ECG):
    - asking patient to position themselves appropriately for ECG measurement
- height:
    - position patient appropriately to measure height
- observe correct manual handling technique when moving equipment into position
- provide clear instructions when positioning people:
    - use technical language correctly
    - provide clear unambiguous instruction
    - speak clearly and confidently using appropriate tone and register
    - demonstrate positions to take clinical measurements if required (for example, standing in the correct way to get a good height reading)

(GEC1, GEC2)

Use and importance of standard operating procedures (SOPs)	
The student must understand: **K1.43 The importance of using SOPs when supporting patient care and ensuring a safe and effective practice environment:** • SOPs help maintain a standardised approach to collecting clinical measurements • ensures a quality process • ensures safety of patients and staff • ensures legal and organisation requirements are followed • ensures professional standards are upheld • helps ensure measurement results are reliable and accurate • helps ensure the recording of measurement data is consistent	The student must be able to: **S1.74 Adhere to SOPs to establish and maintain a safe and effective practice environment and ensure consistency of results:** • demonstrating that SOPs are being followed when taking clinical measurements • demonstrating an understanding of the nature, type and quality of the SOPs to maintain a safe and effective environment • demonstrating that SOPs are being followed to ensure a safe practice environment (GDC5)

Infection control procedures when assisting with healthcare science in physiological, physical and clinical engineering services	

The student must understand:
 	
K1.44 How core knowledge of infection control relates to assisting with healthcare science and in particular collecting clinical measurements:
• causes of infection:
  ○ increased by not changing consumables (for example, not changing PEF tube and thermometer tips)
  ○ not washing or gelling hands between patients
  ○ not changing PPE between patients
  ○ not appropriately decontaminating equipment after it has been in contact with patients
  ○ not cleaning environment appropriately
	The student must be able to:
	
	S1.75 Apply good infection control techniques at all times to maintain a safe environment for service users and staff:
	• wash hands as appropriate
	• wear PPE as appropriate (for example, gloves and apron when taking measurements)
	• adhere to infection control procedure (for example, maintaining a sterile working environment)
	• select different sources to gather information regarding infection control
	• read, understand and synthesise information in accordance with infection control

Infection control procedures when assisting with healthcare science in physiological, physical and clinical engineering services	

• routes of transmission:
  ○ injection
  ○ inhalation
  ○ ingestion
  ○ absorption
• selection of appropriate techniques for prevention and control
• importance of and proper techniques for handwashing
• waste management and dealing with spillages
	(GEC5)

IT systems for recording service user information	
The student must understand:	The student must be able to:

K1.45 How core knowledge of IT systems for recording, storing and sharing patient information relates to assisting with healthcare science and in particular collecting clinical measurements:
• appropriate storage of measurement data
• importance of data input accuracy
• databases:
  ○ hospital information system
  ○ national patient database
  ○ personal demographics service
• network and information systems (NIS), personal demographics service (PDS) and national patient database (NPD) lead to a more standardised way of reporting
• importance of secure systems for recording, storing, disposing and sharing information
• the need for back-up systems
K1.46 The potential consequences of IT data breaches in a healthcare science environment:
• loss of reputation for healthcare organisation
	S1.76 Apply appropriate national and local regulations when using IT systems to obtain and record information in the physiological, physical and clinical engineering services:
	• entering data correctly relating to local IT systems under supervision
	• ensuring they are adequately equipped to maintain safety, security and privacy when obtaining and recording information
	• demonstrating their:
	  ○ digital rights and responsibilities
	  ○ current practices relating to data collection and use (and its defining influence upon individual lives and the world around them)
	(GDC5, GDC6)

IT systems for recording service user information	
or service • release of patient information • penalties and fines for the organisation and individual • third-party litigation **K1.47 Considerations in relation to confidentiality of consultations and medical records:** • records should only be available to appropriate medical personnel • UK GDPR considerations: o unable to telephone results unless identity of recipient is confirmed o information may be faxed to safe havens o unable to email results without encryption • Freedom of Information Act 2000 is used to support the confidentially of consultations and medical records: o standardises ways for people to access medical information (their own and others') o ensures medical information is only accessible where appropriate • consultation confidentiality should be upheld where appropriate as this is covered by professional code of conduct	

Procedures for reporting service user information in physiological, physical and clinical engineering services	
The student must understand: **K1.48 The process of reporting patient clinical measurements while following appropriate SOPs:** • confirm identity of patient on system with name and date of birth: o ask questions appropriately so the student does not provide the patient with the personal information • enter readings if correct	The student must be able to: **S1.77 Accurately record patient information from a range of clinical measurement tasks:** • identify and collect suitable data • enter patient information correctly: o ensure accurate recording on NEWS chart • record clinical measurement results correctly following SOPs • follow note-taking conventions including

Procedures for reporting service user information in physiological, physical and clinical engineering services

- if measurements are within parameters, they would be accepted and the report would be printed
- if measurements are outside of parameters, patient/results would be referred to a senior colleague
- inform patient that measurement results have been entered
- clinician would then return to patient with results

K1.49 The importance of reporting clinical measurement data accurately with appropriate levels of confidentiality:

- if patient identity details are incorrect, results would be placed onto another patient's record
- if patient details are recorded incorrectly, this could lead to false positives/negatives
- details recorded incorrectly could have an impact on clinical treatment and diagnosis
- if data is not stored confidentially, this could result in patient data being compromised

recording patient information as appropriate to the sector

- demonstrate an understanding of the accuracy and precision that is required when collecting clinical measurement information
- process, interpret and apply data accurately by recording patient information
- account for the effects, implications, risks and issues associated with recording patient information
- use appropriate grammar and choice of vocabulary and correct spelling and punctuation

(GEC1, GMC1, GMC5, GDC4, GDC5)

S1.78 Handle all patient information in line with local and national policies to meet all confidentiality requirements:

- when confirming identity, ask questions appropriately so the student does not provide the patient with the personal information
- follow all data protection requirements
- treat clinical information as confidential
- follow all relevant SOPs in relation to handling patient data
- ensure they are adequately equipped to maintain safety, security and privacy when handling patient information:
  - demonstrate understanding of a patient's digital rights and responsibilities
  - current practices relating to data collection and use (and its defining influence upon individual lives and the world around them)

(GDC5)

Urgent or immediate referrals	
The student must understand: **K1.50 Examples of urgent or immediate referral indicators while taking clinical measurements:** • patient shows arrhythmia on electrocardiogram (ECG) • low oxygenation shown on pulse oximeter • sudden onset or worsening breathlessness • chest pain/tightness • loss of consciousness • high/low blood pressure found through blood pressure test • heart attack **K1.51 The actions to follow after noticing signs of an immediate or urgent referral while collecting clinical measurements:** • referring to a senior colleague or line manager • reassuring patients • raising to the crash team (where appropriate)	The student must be able to: **S1.79 Check for any specific urgent or immediate referrals prior to undertaking clinical measurements:** • checking patient medical history • noticing abnormal behaviour • questioning patient on potential referrals • requesting clarification where appropriate (GEC4) **S1.80 Take appropriate actions if an urgent or immediate referral is noted:** • referring to a senior colleague or line manager • reassuring patients • raising to the crash team (where appropriate) • demonstrating understanding of a patient's digital rights and responsibilities (for example, who can access the patient's data) • making relevant and constructive contributions to escalate referral process (GEC6, GDC5)

Performance outcome 2: Contribute to patient care by supporting the collection of a range of specimens for analysis to aid diagnosis and treatment

Job roles, disciplines and divisions in physiological services, physical sciences and life sciences in relation to the collection of specimens

Knowledge – what you need to teach	Skills – what you need to teach

The student must understand:
 	
K2.1 The responsibilities and duties of the job role of a healthcare science assistant (HCSA) when supporting the collection of specimens:
• following SOPs
• infection control
• providing explanations in a way that puts patients at ease
• communicating the purpose of the tests
• confirming patient consent
• explaining the risks and the mitigating steps (for example, infection control, checking for pre-existing conditions)
• carrying out a broad range of tasks under relevant supervision:
  ○ ensuring equipment is fit for use:
  ▪ ensuring reagents in POCT machines are in date
  ▪ ensuring sterile packaging is intact
  ○ preparing equipment for use:
  ▪ making sure correct specimen collection tray is available
  ▪ preparing equipment to send specimens for assessment
  ▪ confirming enough correct consumables are available
  ○ operating medical equipment:
  ▪ POCT devices
  ○ preparing the patient:
  ▪ confirming how the patient would like to be positioned
  ▪ confirming there is no drip in the arm for blood testing
	The student must be able to:
	
	S2.49 Apply knowledge of roles and responsibilities to provide the best service user care when supporting physiological services, physical services and life sciences in the collection of specimens from patients:
	• supporting the healthcare science professional
	• carrying out a broad range of tasks:
	  ○ dipstick test
	  ○ blood glucose test
	• following SOPs:
	  ○ infection control
	  ○ preparing appropriate equipment
	  ○ ensuring equipment is fit for use
	• communicating effectively with patients:
	  ○ explaining things in a way that puts patients at ease
	  ○ communicating the purpose of the tests
	  ○ explaining risks to patients if asked
	• applying knowledge of technical expertise
	• understanding roles and responsibilities
	• applying knowledge of skills proficiency of the physiological and physical services in specimen collections
	• understanding the accuracy or precision that is required in specimen collection in relation to the roles and responsibilities to those that are involved
	
	(GMC1)

Job roles, disciplines and divisions in physiological services, physical sciences and life sciences in relation to the collection of specimens

- confirming patient has followed instructions relevant to specimen collection
- supporting the healthcare science professional
- collecting and inputting data
- forwarding specimen to laboratory for analysis where appropriate
- forwarding results to practitioner from POCT
- recognising when to escalate:
  - incidents
  - patient concerns
  - governance issues

K2.2 The range of patient specimens that can be collected within the physiological sciences:

- cardiac physiology:
  - blood
  - swab (MRSA – methicillin-resistant Staphylococcus aureus, C&S – culture and sensitivity)
- neurophysiology:
  - blood
  - swab (MRSA/C&S)
  - cerebrospinal fluid (CSF)
- respiratory physiology:
  - blood
  - swab (COVID)
  - sputum
  - blood gas measurement (for example oxygen levels)
- audiology:
  - blood
  - swab (MRSA/C&S)
- gastrointestinal (GI):
  - blood
  - swab (MRSA/C&S)
  - faeces
- urodynamic:
  - blood

S2.50 Apply understanding of the scope of practice in these specific areas to ensure effective patient care:

- not undertaking work outside of competence
- selecting different sources to gather information to understand the scope of practice
- reading, understanding and synthesising information to specific areas to ensure effective patient care

(GEC5)

S2.51 Contribute to research and innovation within the boundaries of relevant clinical and scientific practice as required:

- support the healthcare science professional
- carry out a broad range of tasks under supervision:
  - record results of research in compliance with research project
  - discuss specimen collection with senior colleagues
- follow regulatory framework
- record data
- listen actively to contributions of others to support research and innovation
- make relevant and constructive contributions to move discussion forward
- recognise the difference between fact and opinion
- recognise bias to enable work within the boundaries of clinical and scientific practice
- contribute to the drafting of standard technical documents for particular sectors using precise terminology and agreed formats
- request clarification where appropriate to support research and innovation

Job roles, disciplines and divisions in physiological services, physical sciences and life sciences in relation to the collection of specimens

- swab (MRSA/C&S)
- urine

K2.3 The range of patient specimens that can be collected within the physical sciences:

- nuclear medicine:
  - blood
- environmental testing:
  - water sampling
  - endoscope
  - mattress swabbing
  - theatre air sampling

K2.4 The purpose of a range of life science divisions:

- blood sciences:
  - clinical biochemistry:
    - concerned with bodily fluids for diagnostic and therapeutic purposes
  - clinical immunology:
    - concerns with immune system diseases and infections
  - haematology:
    - study of diseases of blood and bone marrow, and how to treat them
  - transfusion services:
    - diagnostic and therapeutic services to provide vital support for blood transfusion, organ and stem cell transplantation
  - histocompatibility and immunogenetics:
    - carries out tests to support stem cell and organ transplantation
- cellular sciences:
  - cytopathology:
    - diagnostic technique that examines cells from various body sites to determine cause and nature of disease
  - histopathology:
    - microscopic examination of tissue and/or cells in order to study disease

- use technology as appropriate to carry out the systematic collection, processing and organisation of data to support research and innovation

(GEC3, GEC4, GEC5, GEC6)

S2.52 Recognise the need to refer and effectively refer patients to another member of the healthcare team:

- recognise when a task is outside of their scope of practice
- recognise when to escalate concerns:
  - faulty equipment
  - medical emergencies
- make relevant and constructive contributions to move discussion forward
- express opinions and present these with relevant and persuasive arguments
- sum up key points of discussion
- give explanations to other members of the healthcare team, both orally and in writing, in a clear and unambiguous way to make appropriate referrals
- use technical language correctly, using graphics and other tools to aid referral
- speak clearly and confidently using appropriate tone and register that reflects audience and purpose
- select key information from written text/oral discussions to recognise the need to refer and summarise concisely (orally or in writing) in style appropriate to audience and purpose

(GEC1, GEC2, GEC4, GEC6)

Job roles, disciplines and divisions in physiological services, physical sciences and life sciences in relation to the collection of specimens	
○ reproductive science: ▪ science of providing life and finding solutions to fertility • genomic sciences: ○ genomics: ▪ branch of molecular biology concerned with the structure, function, evolution and mapping of genomes ○ genetic counselling: ▪ advising individuals and families about risks of genetic disorders • infection sciences: ○ microbiology: ▪ study of microorganisms ○ virology: ▪ study of viruses **K2.5 The role of CPD in order to develop professional practice and support continuous improvement:** • improving patient care: ○ use of new technologies such as POCT devices • supporting career progression • maintaining up-to-date practice: ○ new testing panels when collecting specimens ○ use of new procedures • reacting to needs of workforce **K2.6 The techniques within self-reflection and evaluation, including the use of tools and opportunities for undertaking reflective practice:** • reflecting upon specific experiences and situation when collecting specimens: ○ working within different environments such as wards and clinics • principle stages of Kolb and Gibbs reflective cycles • engaging in self-reflection opportunities (for example, collaborative meetings with	

Job roles, disciplines and divisions in physiological services, physical sciences and life sciences in relation to the collection of specimens	
laboratory staff) **K2.7 The purpose of collecting a range of specimens across physiological, physical and life sciences, to investigate, diagnose and treat disease:** • blood: o detect chemical imbalance o detect enzymes o detect abnormal levels of endogenous and exogenous chemicals o detect if an infection is present (cell counts) o check for hereditary diseases in newborns (for example, sickle cell disease) o monitor treatment (for example, check to see if a tumour is declining/increasing) o detect antibodies for suspected autoimmune conditions or allergy screenings • urine: o detect infection o detect chemical imbalance (for example, sugars and proteins) o detect hormones (for example, human chorionic gonadotropin (hCG)) o detect possible cancers • faeces: o detect nutrient malabsorption o detect parasites • swab: o detect infection (for example, coronavirus) o detect carriage (MRSA) • saliva: o detect chemicals (for example, certain drugs) o genetic analysis • environmental: o detect presence of acceptable levels of microorganisms	

Job roles, disciplines and divisions in physiological services, physical sciences and life sciences in relation to the collection of specimens	

K2.8 Responsibilities of a range of roles within a multi-disciplinary team for the collection of specimens within the physiological and physical environment:
• healthcare science assistant:
  ○ preparing specimen collection equipment
  ○ preparing patients
  ○ preparing datasheets
  ○ labelling specimens
• healthcare science associate practitioner:
  ○ taking specimens
  ○ labelling specimens
  ○ completing datasheets
• healthcare scientist:
  ○ writing specimen collection SOPs related to dialysis water collections
K2.9 Certain activities which can only be completed by registered professionals:
• reviewing and validating results can only be completed by biomedical scientists and clinical/medical scientists
• advising on treatment can only be completed by clinical/medical scientists
K2.10 The importance of adhering to the regulatory framework within which research and innovation is conducted by the Health Research Authority (HRA) and Medicines and Healthcare products Regulatory Agency (MHRA):
• ensures good clinical practice
• minimises risks
• ensures research is carried out following ethical principles:
  ○ ensures informed consent
  ○ ensures participants are informed about the risks
  ○ safeguards participants
  ○ protects participant confidentiality
• ensures validity of research carried out
• not following these guidelines can result in	

Job roles, disciplines and divisions in physiological services, physical sciences and life sciences in relation to the collection of specimens	
invalidating studies **K2.11 How the role of healthcare science assistant (HCSA) may contribute to research and innovation within the collection of specimens:** • HCSA may collect specimens to be analysed for research • HCSA may record results of research in compliance with research project • HCSA may collect clinical specimens following new procedures and comparing with old procedures • HCSA may discuss specimen collection with senior colleagues **K2.12 The purpose of associated accreditation bodies within healthcare science:** • confirms the department has the facilities to adhere to quality standards • confirms the department has the governance to adhere to quality standards • confirms the department has the correct personnel to adhere to quality standards **K2.13 The responsibilities of the HCSA in quality assurance, management and improvement:** • HCSA must adhere to quality processes • HCSA involvement with audit cycle work **K2.14 Factors that would dictate the need to seek support and advice from clinical colleagues:** • faulty equipment (for example, POCT devices) • medical emergencies (for example, fainting after blood being taken, hematoma) • patient is non-responsive • patient is in unusual pain or discomfort • sudden onset of new symptoms • difficult or challenging patient behaviour (for example, phobias of needles) • patient characteristics and ability to determine mental capacity • communication barriers • pre-existing medical condition making it	

Job roles, disciplines and divisions in physiological services, physical sciences and life sciences in relation to the collection of specimens	
technically challenging to collect the specimen • technical difficulties in specimen collection (for example, accessing veins during phlebotomy) • considerations in respect of sexuality, culture and religion (for example, making sure client is comfortable with blood being taken) • unexpected/unusual results in POCT	

Specimen collection procedures	
The student must understand: **K2.15 The definition of clinical/patient specimen:** • a specimen taken from a patient for the purpose of analysing fluid or tissue **K2.16 How different types of specimens are collected:** • blood: o use of different collection points: ▪ venous/arterial ▪ line ▪ heel ▪ finger • urine: o midstream urine (MSU) o early morning urine (EMU) o catheter specimen urine (CSU) o pad (from nappy/incontinence pad) • faeces: o patient collection o assisted patient collection • sample obtained by swab: o rub swab over required area for screening: ▪ nose ▪ throat	The student must be able to: **S2.53 Apply knowledge of principles of anatomy and physiology to support the safe and appropriate collection of a specimen from a patient:** • support the practitioner in the collection of specimens • perform an MRSA swab collection • use knowledge of anatomy and physiology in context to find appropriate solutions to collection of specimens: o to identify correct/alternate sampling sites • use specialist notation/representation to reflect clinical standard practice • apply knowledge of anatomy and physiology to collect specimens • understand and synthesise information regarding anatomy and physiology to support the collection of specimens • provide supporting documentation in different formats (for example, specimen collection charts) • ask and respond to questions for clarification around knowledge of anatomy and physiology • demonstrate an understanding of the accuracy that is required in the measurement for the particular purpose of specimen collection

Specimen collection procedures	
▪ perineum ▪ wound ▪ cervix ▪ saliva o place swab on infected area • environmental: o swab areas on mattresses o collecting air using slit air sampler o collecting water samples: ▪ dialysis machines ▪ water plants **K2.17 The rationale and overarching principles of specimen collection:** • reasons for specimen collection: o laboratory analysis for monitoring and treatment o laboratory analysis to aid with diagnosis o screening o research • overarching principles for specimen collection: o informed consent o following SOPs at all times (for example, infection control) o specimens collected in line with clinical requirements (for example, only taking blood for specified tests) **K2.18 How underpinning knowledge of anatomy and physiology relates to the collection of specimens:** • blood: o cardiovascular system: ▪ vessels and components of blood in relation to sampling sites and blood specimen containers • urine: o renal system and components of urine in relation to sampling and urine specimen containers • faeces:	(GEC2, GEC5, GEC6, GMC1, GMC2) **S2.54 Apply knowledge of principles of specimen collection to support the safe and appropriate collection of a specimen from a patient:** • support the practitioner in the collection of specimens from patients • communicate to a patient how they could complete a midstream urine collection • confirm urine sample container is secure and labelled at the correct time • identify (when collecting from the lab) if a specialised container is required • prepare for the collection of blood: o correct tubes o correct order • recognise and understand cumulative errors and the effect that errors in measurement have on subsequent specimen collections • understand the accuracy or precision that is required in specimen collection • understand how to work with very large and/or very small numbers and units of measurement when collecting specimens • read, understand and synthesise information to support the safe and appropriate collection of specimens • ask and respond to questions for clarification for safe collection of specimens (GEC5, GEC6, GMC1, GMC2) **S2.55 Undertake specimen collection using appropriate procedures and following SOPs:** • infection prevention control measures • risk assessment measures • waste disposal measures • health and safety requirements • demonstrate an understanding of the nature, type and quality of the SOPs to maintain a safe and effective environment when undertaking specimen collection

Specimen collection procedures	
○ gastrointestinal system in relation to sampling and faeces specimen containers • saliva: ○ gastrointestinal systems in relation to presence of salivary glands **K2.19 The procedures for a range of specimen collection techniques, including the range of sampling sites which may be used:** • procedure for drawing blood: ○ assemble equipment: ▪ correct sampling tubes ○ identify and prepare patient ○ select sampling site: ▪ antecubital fossa (crook of the elbow) ▪ cephalic vein (back of the wrist) ▪ finger/heel ○ perform hand hygiene and put on gloves ○ disinfect entry site: ▪ take blood ○ fill laboratory sample tubes ○ add label with patient details ○ draw samples in the correct order • procedure for collecting midstream urine: ○ explain requirements to patient ○ provide sterile screw top container to patient ○ allow patient to collect sample of urine midstream and secure container lid ○ return to HCSA who will label container and ensure lid is secured ○ patient and HCSA would wash hands after collection and upon receipt of containers • procedure for collecting MRSA: ○ twist to remove cap form transport tube ○ remove swab ○ place swab 2cm into nostril ○ rotate swab ○ use same swab for the other nostril	(GDC5) **S2.56 Recognise the need to refer and when to refer patients to another member of the team:** • follow SOPs • handover notes outlining technical difficulties with specimen collection (for example, which swab to use for a viral culture for a viral rash) • experiencing challenging contraindications while taking specimens • express opinions and support these with relevant and persuasive arguments • encourage contributions from other members of the team • give explanations to other members of the healthcare team, both orally and in writing, in a clear and unambiguous way to make appropriate referrals • use technical language correctly, using graphics and other tools to aid referral • speak clearly and confidently using appropriate tone and register that reflects audience and purpose • select key information from written text/oral discussions to recognise the need to refer and summarise concisely (orally or in writing) in style appropriate to audience and purpose (GEC1, GEC2, GEC4, GEC6) **S2.57 Recognise the need to adhere to legal requirements in respect of reporting suspected cases of abuse when collecting specimen from patients:** • raise concerns to senior members of the team • identify safeguarding concerns when speaking to patients • active listening • separate fact from opinion • use appropriate legal and clinical terms • provide the appropriate level of detail in

Specimen collection procedures	
○ place swab into tube ○ label tube and return to laboratory **K2.20 The importance of adhering to health and safety requirements, including the use of personal protective equipment (PPE) and infection prevention control when collecting specimens:** • infection prevention for patients and individuals: ○ through the use of PPE ○ through use of sterilisation and disinfection of equipment ○ ensuring single-use equipment is used appropriately ○ ensuring reusable equipment is decontaminated appropriately ○ adhering to SOPs • preventing injury to patients or individuals: ○ manual handling injuries ○ needle-stick injuries • avoiding damage to equipment **K2.21 How the principles of person-centred care relate to specimen collection and ensure that these are adhered to when undertaking any specimen collection procedure:** • privacy and dignity: ensure specimen collection is undertaken in a private room/screened off area • confidentiality: ensure any records of procedures undertaken as part of specimen collection or any medical records are confidential • candour and honesty: explain why the specimen is needed, clearly explain procedure which is about to take place • empathy: provide reassurance at all stages throughout the process of collecting specimens • diversity and inclusion: take patient characteristics into consideration when collecting specimens, communicating clearly to patients • consent: gain consent before specimens	written reports to reflect patient safety and legal requirements • students must be adequately equipped to maintain the patient's safety, security and privacy when recognising potential cases of abuse (GEC3, GEC4, GDC5) **S2.58 Gather information to support the safe and appropriate collection of the specimen, through questioning, listening to and observing patients and/or carers:** • support the practitioner in the gathering of information • use mathematical processes to support technical arguments and communicate effectively to a range of stakeholders • take patient characteristics into consideration • appropriately ask patient about contraindications they may be predisposed to • ask and respond to questions for clarification • listen actively to contributions of others • use key information from written text/oral discussions and observations to summarise concisely (orally or in writing) in style appropriate to collection of specimens • listen actively and record information accurately and concisely • demonstrate an understanding of digital rights and responsibilities and current practices relating to data collection and use • select different sources to gather information to support safe and appropriate collection of specimens (GEC4, GEC5, GEC6, GMC8, GDC5) **S2.59 Demonstrate person-centred care when undertaking sample collection:** • listen actively to contributions and concerns of the patient • use mathematical processes to support technical arguments and communicate effectively to a range of stakeholders

Specimen collection procedures	
are collected • duty of care: raise safeguarding concerns when collecting specimens **K2.22 The contraindications and other considerations associated with specimen collection techniques** • blood collection: o contraindications: ▪ evidence of cellulites or abscesses ▪ venous fibrosis on palpation ▪ presence of hematoma ▪ presence of vascular shunt or graft ▪ presence of vascular access device o considerations: ▪ difficulty accessing veins ▪ hydration levels ▪ communication barriers (for example, language, autism, deafness) • urine collection: o contraindications: ▪ presence of substances may invalidate analysis ▪ time of collection o considerations: ▪ dehydration ▪ patient taking medications/supplements ▪ diet ▪ exercise **K2.23 The importance of safety management procedures when collecting specimens:** • specimens taken from patients with prion diseases: o must be autoclaved alone o specific temperature autoclave in compliance with Health and Safety Executive (HSE) regulations o all waste material including condensate must be collected and incinerated o without following waste stream	• listen actively and record information accurately and concisely • speak to the service user to put them at ease • speak clearly and confidently using appropriate tone and register that reflects the patient • respond to questions/feedback from the patient (GEC1, GEC2, GEC4, GEC6, GMC8) **S2.60 Demonstrate the ability to use appropriate waste streams for consumables associated with specimen collection:** • identifying and following correct waste disposal procedures • placing waste products in correct colour coded waste stream • asking and responding to questions for clarification (GEC6) **S2.61 Recognise appropriate disinfection/sterilisation requirements for consumables associated with sample processing:** • check that consumables are sterile and in date • ask and respond to questions for clarification (GEC6)

Specimen collection procedures	
procedures, it is possible to contaminate waste streams and put the general public at risk o possible risk of prosecution if processes are not adhered to	

Equipment and resources used in the collection of patient specimens	
The student must understand: **K2.24 The purpose of a range of equipment and resources used in specimen collection techniques:** • blood collection: o colour coded blood collection tubes o tourniquet o needles/syringes (various gauges/lines to meet individual patient need) o skin sterilisation wipes o plasters/gauze and tape o disposable gloves o apron o sharps box • urine collection: o colour coded and sterile universal containers (to meet individual patient needs) o catheter o catheter bags o disposable gloves o apron • faecal collection: o colour coded universal container o bowel cancer screening kits (for example, faecal immunochemical test) • sputum collection: o sterile pot • swab collection:	The student must be able to: **S2.62 Use equipment and resources appropriately in the collection of patient specimens:** • support the practitioner • prepare the tray for the sample collection: o order the tubes correctly • make sure equipment is used correctly • demonstrate an understanding of issues concerning the calibration of equipment • ask questions to test understanding (GEC1, GMC1) **S2.63 Apply appropriate disinfection/sterilisation methods for equipment used to collect patient specimens:** • follow disinfection and sterilisation SOPs • follow infection control policy • check equipment is sterile • ask questions to test understanding (GEC1)

Equipment and resources used in the collection of patient specimens	
○ colour coded swabs: ▪ transport swabs for microbiology ▪ virology swabs ▪ chlamydia swabs **K2.25 The processes to ensure equipment used in the collection of specimens is fit for use:** • follow relevant SOPs • prepare all equipment in advance • calibrate devices where appropriate (for example, portable glucose monitor) • check service labels • check equipment is sterile (for example, endoscopic collection) or clean (for example, portable equipment) **K2.26 How infection control procedures are used while collecting specimens in relation to equipment and resource use:** • follow relevant SOPs • appropriate handwashing • use appropriate PPE • appropriate use of single and multiple-use equipment • confirm suitability of use: ○ check for damage ○ check product date • place specimen in appropriate collection area • clean equipment and area after use • disposal of single-use resources **K2.27 The requirements for stock rotation of equipment for specimen collection:** • all resources used for collection of specimens will have expiry dates (for example, blood tubes) • resources with earliest expiry date should be stored at the front • always use resources with earliest expiry date first • shelf life remaining must be sufficient for the resources to be used before the expiry date	

Handling collected specimens	
The student must understand: **K2.28 The requirements for accurate labelling:** • patient full name or coded identifier • date of birth • hospital or NHS number • minimum number of key identifiers must be adhered to • date and time of collection • chain of custody – only required in certain situations (for example, drugs of abuse, forensic collection) **K2.29 The requirements to ensure effective packaging, storage and transportation of specimens within and outside of a healthcare facility:** • requirement to have lockable fridges or secure access to laboratory • requirement to record minimum and maximum temperatures of fridge • specimens should be transported in a sealed container with a biohazard label • requirement to fill out labels directly after collecting specimens • complete required documentation: o send away book/spreadsheet • requirement to follow postal regulations when posting specimens • requirement to follow road, air and freight acts when transporting specimens (for example, appropriate licence/insurance required to transport specimens) • requirements to transport specimens through pneumatic tubes • metal carriers/cool boxes used for transportation of specimens must be cleaned and disinfected weekly **K2.30 The impact of national legislation and accreditation standards on local guidance when handling specimens:** • national legislation (for example, the	The student must be able to: **S2.64 Handle patient information in line with local and national policies to meet all legislative and legal requirements and keep information confidential:** • adhering to minimum number of key identifiers • ensuring they are adequately equipped to maintain safety, security and privacy when handling patient information • demonstrating an understanding of the patient's: o digital rights and responsibilities o current practices relating to data collection and use (and its defining influence upon individual lives and the world around them) (GDC5) **S2.65 Record all required patient information on a collected sample, ensuring that this information is accurate and is consistent across all documentation related to the sample:** • use appropriate grammar and choice of vocabulary and correct spelling and punctuation • provide the appropriate level of detail to reflect patient information • proofread texts, applying agreed workplace practices to ensure data accuracy • provide supporting documentation in different formats depending upon samples required • demonstrate an understanding of digital rights and responsibilities and current practices relating to data collection and use (GEC1, GEC2, GEC3, GDC5) **S2.66 Record the collection of the sample and pertinent information:**

Handling collected specimens

Carriage of Dangerous Goods by Road and Rail (Classification, Packaging and Labelling) Regulations 1994)

- accreditation standards:
  - ISO standards (for example, ISO6710:2017)
- local guidance:
  - informed by national legislation
  - informed by accreditation standard requirements
  - SOPs may differ slightly dependent on locality

K2.31 The requirements for handling category 4 specimens (for example, specimens carrying an infection in which there is currently no cure or vaccination) and their restrictions:

- specimens should be clearly labelled as high risk
- specimens should be double bagged
- specimens should be transported in specialised containers
- specialised facilities and staff required

K2.32 The purpose of cold chain management:

- a system for ensuring that optimal temperature conditions are maintained for specimens and certain products, during collection, storage, transportation and analysis

K2.33 The temperature requirements for different specimen types:

- blood:
  - 2 to 6 degrees Celsius
  - plasma and serum can be frozen at -20 degrees Celsius if not analysed within 7 days
  - must be stored in approved fridges
  - stored for up to 7 days
  - blood culture bottles incubated and stored at 37 degrees Celsius
  - sample stability and length of storage may change slightly dependant on sample type and tests for analysis
  - some tests may not be stable for 7 days

- complete send away document
- demonstrate an understanding of digital rights and responsibilities and current practices relating to data collection and use
- use appropriate grammar and choice of vocabulary and correct spelling and punctuation
- provide the appropriate level of detail to reflect collection of a sample
- provide supporting documentation in different formats depending upon samples required

(GEC1, GEC2, GEC3, GDC5)

S2.67 Package samples appropriately for transportation, adhering to national legislation and local guidance:

- refer to secondary facility
- post specimens correctly
- read and understand information in accordance with transportation and packaging of samples
- ask and respond to questions for clarification

(GEC5, GEC6)

S2.68 Store samples correctly until collected for transportation, analysis or disposal:

- store samples relating to correct temperature requirements
- identify when specimens have deviated from storage requirements
- label samples appropriate to level of risk
- label samples appropriately when being sent for analysis
- read and understand information in accordance to storing of samples
- ask and respond to questions for clarification

(GEC5, GEC6)

Handling collected specimens	
and may need to be frozen sooner if not analysed immediately • urine: o around 4 degrees Celsius o can be stored at -20 degrees Celsius if not analysed within 7 days o must be stored in an approved fridge o stored for up to 7 days • faeces: o must be fresh for accurate results o 2 to 6 degrees Celsius o can be stored for up to 7 days • swabs: o stored for 7 days o 2 to 6 degrees Celsius o must be stored in approved fridges • MRSA swabs: o stored for 48 hours o room temperature **K2.34 The process of dealing with specimens after a deviation from temperature requirements:** • specimens must be destroyed if there is deviation from the storage requirements • if temperature deviation is a result of equipment failure, equipment must be investigated • if equipment has failed, emergency storage procedures will be implemented • temperature deviations and details of specimens affected must be recorded • incident report must be logged	

Disease states and the collection of specimens	
The student must understand:	The student must be able to:
K2.35 How communicable disease states (for example, HIV, hepatitis, MRSA) impact the	**S2.69 Identify disease states which may affect**

Disease states and the collection of specimens	
specimen collection procedures: • implements any required additional infection control procedures (for example, if patient is barrier nursed) **K2.36 How non-communicable disease states (for example, diabetes, dehydration, vascular disease) impact the specimen collection procedure:** • may need to use alternative sample site to collect blood specimen (for example, veins collapse for dehydrated patients) • may be unable to get urine sample for dehydrated patient: o may need to request they drink water • confirm dietary state of diabetes patient: o cannot ask diabetic to fast, as it impacts blood measurements o would only ask them to fast in special circumstances • asthmatics would need to refrain from using inhaler prior to providing peak expiratory flow (PEF) where possible: o adjustments on PEF readings can be done if the inhaler is used and the prescription of the inhaler is known • may need to change patient position while taking blood (for example, laying patient down) **K2.37 How to check for non-communicable disease states:** • appropriate questioning of the patient: o asking about their recent diet and medication o asking if they have shortness of breath o asking if they are passing urine often o asking if they are often thirsty o asking if they have swollen limbs o asking about weight variation o asking about history of disease in family • visually checking signs of non-communicable disease states: o patient pallor indicates they feel faint or	**specimen collection:** • visually check for signs of non-communicable disease • ask and respond to questions for clarification (GEC6) **S2.70 Make reasonable adjustments to specimen collection procedures in relation to identified disease states, for example, use of alternative equipment:** • ask dehydrated patients to drink water before providing urine tests • when possible, do not ask diabetic patients to fast prior to collecting blood • ask asthmatics to refrain from using inhaler immediately before peak expiratory flow (PEF) measurement • adjust peak expiratory flow (PEF) measurement reading if asthmatic takes inhaler prior to test • use appropriate infection control • use alternative sites where necessary • demonstrate an understanding of the accuracy and precision required for measurement when identifying disease states • ask and respond to questions for clarification (GEC6, GMC1)

Disease states and the collection of specimens	
anaemic ○ shortness of breath **K2.38 How disease states may affect the specimen collected:** • certain medicines may affect urine composition (for example, medicines required for disease states) • diet and intake may impact urine and blood results – may cause difficulties for diabetic patients to provide good samples	

Waste streams for equipment used in the collection of specimens	
The student must understand: **K2.39 How to use appropriate waste streams and colour coded waste procedures for specimen collection equipment and resources:** • black or clear bags: ○ domestic type waste • yellow and black striped bag: ○ offensive waste from human/animal within healthcare • yellow bag: ○ infectious waste contaminated with chemicals • orange bag/orange-lidded yellow container: ○ infectious waste, not containing chemicals or medicinal contamination • red-lidded rigid yellow container: ○ anatomical waste • yellow sharps box: ○ sharps, medicinally contaminated, other than cytotoxic and cytostatic • orange-lidded yellow sharps box: ○ sharps, non-medicinally contaminated • purple-lidded yellow sharps box: ○ sharps, contaminated with cytoxic and	The student must be able to: **S2.71 Recognise appropriate waste streams for equipment and resources used to collect patient specimens:** • identify appropriate colour coded waste procedures • ask questions to test understanding • request clarification where appropriate (GEC1, GEC4) **S2.72 Dispose of any equipment and resources, adhering to relevant legislation and local guidelines:** • dispose of equipment and resources using appropriate colour coded waste procedures • read and follow legislation and guidelines in accordance with disposing of equipment • ask and respond to questions for clarification (GEC5, GEC6)

Waste streams for equipment used in the collection of specimens	
cytostatic medicines • purple-lidded yellow rigid container or purple and yellow sack: o other infectious waste contaminated with cytoxic and cytostatic medicines **K2.40 The purpose of waste related legislation relevant to the equipment and resources used in collection of specimens:** • Environmental Protection Act 1990: o makes provision for the improved control of pollution to the air, water and land, by regulating the management of waste and control of emissions o waste duty of care code of practice • Controlled Waste (England and Wales) Regulations 2012: o defines different waste types and how these waste types should be treated • Hazardous Waste (England and Wales) Regulations 2005: o controls the storage, transport and disposal of hazardous waste (waste stream) to ensure it is appropriately managed and any risks are minimised • Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009: o regulates the carriage of dangerous goods by road	

Requirements for good stock control and storage/use of limited stability products	
The student must understand:	The student must be able to:
K2.41 The process of good stock control and storage of limited stability products: • stock is checked for expiry dates • stock is quality controlled in line with accreditation requirements • damaged stock is removed, logged and	**S2.73 Maintain adequate stock levels of all products used in the collection of specimens, following procedures for re-ordering when required:** • ensure stock levels are at adequate levels prior to clinics

Requirements for good stock control and storage/use of limited stability products	
recorded with manufacturer • stock is stored in date order (stock rotation) • information is recorded electronically within software packages on analysers • software would flag expiry dates as an error if expired stock is used on devices (for example, POCT) • software is used to ensure stock levels are adequate and places an order when minimum levels are reached	• ensure stock is stored in date order • demonstrate an understanding of the accuracy and precision that is required in maintaining stock levels • critical interpretation of spreadsheet displays to maintain stock levels • use knowledge of context to find appropriate and approximate solutions to calculations including: o estimations of stock levels o accurate calculations of stock levels • read and understand procedures for ordering stock (GEC5, GMC1, GMC2) **S2.74 Ensure all products are fit for use and rotate stock as appropriate:** • check dates on products • check for damage on products • place older stock at the front • understand issues concerning the calibration of products • ask and respond to questions for clarification • identify key factors that will be taken into account when rotating stock (GEC6, GMC1, GMC10)
Point of care testing (POCT)	
The student must understand: **K2.42 What point of care testing (POCT) is:** • medical diagnostic testing at or near the point of care, at the time and place of service user care • carried out in a wide range of settings (for example, on ward, in patient's home) • often part of the role of a HCSA **K2.43 The reasons for an increased use in POCT, and how this may impact the role of a healthcare science assistant (HCSA):**	The student must be able to: **S2.75 Perform point of care testing (POCT) techniques on a range of individuals, following all required guidelines and applying knowledge of the tests that can be undertaken:** • dipstick test • blood glucose test • demonstrate an understanding of the accuracy or precision that is required in measurement when undertaking POCT

Point of care testing (POCT)

- POCT provides rapid results and greater patient comfort
- POCT may be undertaken by a HCSA
- POCT is accessible for patients and HCSAs
- HCSA can inform patients on how to get valid and reliable POCT results (for example, how patient lifestyle can impact results)

K2.44 The advantages and disadvantages of POCT:

- advantages:
  - less invasive
  - reduced turnaround time
  - rapid data availability
  - better monitoring of conditions
- disadvantages:
  - concerns around inaccuracy
  - may have to repeat tests
  - lack of connectivity to hospital IT systems
  - high cost of equipment
  - quality of testing operator dependent

K2.45 The principles and processes of undertaking a range of common POCT:

- blood glucose test:
  - testing glucose levels
  - amperometric bio-sensor strip within handheld monitor
  - follow glucometer SOPs and manufacturer instructions
- pregnancy test:
  - testing for hormone levels to confirm pregnancy
  - lateral flow, immunochromatographic assays within stick
  - follow test SOPs and manufacturer instructions
- urinalysis:
  - urine chemistry, group of multiple tests to check content of urine sample (for example, proteins, sugars, hormones, acidity, alkalinity)
  - uses dipsticks and corresponding charts

- read and understand legislation and guidelines in accordance with POCT
- ask and respond to questions for clarification
- demonstrate technical expertise, understanding and skills proficiency across a reasonable range of commonly used devices in order to operate effectively within digitised contexts

(GEC5, GEC6, GMC1, GDC1)

S2.76 Provide person-centred care when undertaking POCT:

- engage with patients following principles of person-centred care
- speak to the service user to put them at ease
- ask and respond to questions for clarification
- listen actively to contributions of the patient
- listen actively and record information accurately and concisely
- speak clearly and confidently using appropriate tone and register that reflects audience and purpose to provide patient-centred care

(GEC2, GEC4, GEC6)

S2.77 Apply consent procedures when undertaking POCT:

- follow required guidelines for consent as part of person-centred care
- listen actively and record information accurately and concisely
- ask and respond to questions for clarification
- speak clearly and confidently using appropriate tone and register that reflects audience and purpose for gaining consent

(GEC2, GEC4, GEC6)

S2.78 Gather information to support safe and appropriate POCT through questioning, listening to and observing patients and/or

Point of care testing (POCT)	
○ follow test SOPs and manufacturer instructions • blood gas test: ○ testing for blood pH, blood gas partial pressure of oxygen and partial pressure of carbon dioxide, electrolytes and metabolites for whole blood samples ○ potentiometric test strips within analyser ○ follow test SOPs and manufacturer instructions **K2.46 The purpose of quality management for POCT equipment:** • ensure equipment is fit for use • ensure equipment provides accurate and reliable results **K2.47 The requirements for managing quality in POCT:** • compliance with ISO accreditation standards • routine maintenance • calibration • timely escalation of any issues with equipment • use of SOPs • documentation and recording of equipment, maintenance, and calibration of results • training, monitoring and updating of equipment users (for example, service users, healthcare professionals) • ensuring software is up to date **K2.48 The purpose of different self-testing digital healthcare technologies:** • blood glucose monitoring • cholesterol monitoring • warfarin self-monitoring • hormone and pregnancy testing	**carers:** • inform and guide patient or carer on how to perform POCT • use mathematical processes to support technical arguments and communicate effectively to a range of stakeholders • use key information from written text/oral discussions and observations to summarise concisely (orally or in writing) in style appropriate to collection of POCT • listen actively and record information accurately and concisely • select different sources to gather information to support safe and appropriate collection of POCT • demonstrate an understanding of digital rights, responsibilities and current practices relating to data collection and use (GEC4, GEC5, GMC8, GDC5) **S2.79 Promote health and wellbeing, both physical and mental, at all times when working with patients, including during POCT:** • encourage patients to consider how lifestyle impacts POCT results (for example, diet and glucose monitoring) • ask the service user questions to check their level of understanding • encourage contributions from patients and support these with relevant and persuasive arguments • select different sources to gather information to promote health and wellbeing • give explanations to patients, both orally and in writing, in a clear and unambiguous way, taking into account the level and experience of the audience (for example, explaining POCT) (GEC1, GEC5, GEC6) **S2.80 Obtain reliable data from POCT using appropriate techniques, following SOPs:** • dipstick test

Point of care testing (POCT)	
	• pregnancy test • blood glucose test • check equipment to make sure it is appropriately calibrated and maintained before use • follow SOPs and manufacturer instructions • demonstrate an understanding of the nature, type and quality of the SOPs for POCT • develop the skills, tools and platforms which enable them to design, create and amend: o high quality outcomes to obtain reliable data from POCT (GDC2, GDC5) **S2.81 Apply good clinical and scientific practice when undertaking all activities in respect of POCT, including quality management of equipment:** • ensure all quality requirements have been met in relation to POCT • understand how POCT is completed, sifted, selected (sampled) and organised • understand how POCT is presented by using a range of visual/graphical displays • respond to questions/feedback from colleagues and patients (GEC6, GMC6)

Performance outcome 3: Contribute to patient care by processing and analysing service user specimens in a range of life science areas and laboratory environments to produce reliable data sets for use by healthcare professionals in diagnosis and treatment

Job roles, disciplines and divisions in the processing and analysing of service user specimens	
Knowledge – what you need to teach	**Skills – what you need to teach**
The student must understand: **K3.1 The responsibilities and duties of the job**	The student must be able to: **S3.38 Apply knowledge of roles and**

Job roles, disciplines and divisions in the processing and analysing of service user specimens	
role of a healthcare science assistant (HSA) when supporting the processing and analysing of specimens: • following standard operating procedures (SOPs) • infection control • carrying out a broad range of tasks under relevant supervision: o ensuring equipment is fit for use: ▪ carrying out quality control checks and maintenance checks on analysers (this would be reviewed by registered scientists) o preparing equipment for use: ▪ topping up fluids within analysers ▪ checking kit levels o operating scientific equipment: ▪ microscope ▪ centrifuge ▪ pipette o communicating with service users: ▪ discussing specimens ▪ discussing handover of specimens ▪ discussing priorities o engaging in inter-departmental communications, attending and contributing where required • collecting and inputting data • forwarding specimen results to clinician for their interpretation • recognising when to escalate: o device issues o specimen concerns o stock issues	**responsibilities to provide the best service user care when processing and analysing patient specimens within a range of laboratory environments:** • supporting the healthcare science professional • carrying out a broad range of tasks: o undertake enzyme-linked immunosorbent assay (ELISA) techniques o undertake chromatography • following standard operating procedures (SOPs): o infection control o preparing appropriate equipment o ensuring equipment is fit for use • communicating effectively with service users • applying knowledge of technical expertise • demonstrating an understanding of roles and responsibilities • applying knowledge of skills proficiency of the laboratory environment services across a reasonable range of commonly used devices in order to operate effectively within digitised contexts • processing, interpreting and applying data accurately and searching for and gathering evidence efficiently (GDC1, GDC4)
K3.2 The duties of a HSA who is processing and analysing a range of specimens within the following life science areas and laboratory environments: • blood sciences: o analysing patient specimens to help with the diagnosis and management of their	**S3.39 Apply understanding of the scope of practice in these specific areas to ensure effective service user care:** • only work within competence • identify limits of role • select different sources to gather information to understand the scope of practice • read, understand and synthesise information to specific areas to ensure effective patient care (GEC5)

Job roles, disciplines and divisions in the processing and analysing of service user specimens	
condition ○ helping to diagnose and monitor conditions that attack the immune system (for example, autoimmune diseases) or which trigger the immune system to defend itself (for example, allergies) ○ supporting the healthcare scientist in assisting the diagnosis and monitoring of blood disorders, and cross-matching blood to ensure the correct type of blood is issued for patients requiring a blood transfusion • cellular sciences: ○ supporting the healthcare scientist to receive, dissect and prepare fluid and tissue samples for examination and diagnosis ○ supporting the healthcare scientist to examine cervical, fluid and tissue samples for abnormalities ○ supporting the healthcare scientist examining samples under a microscope to reveal the structure of cells and tissues • genomic sciences: ○ supporting the healthcare scientist in the chemical examination of cellular DNA around prenatal diagnosis, carrier testing and confirmation of diagnosis of inherited and acquired conditions • infection sciences: ○ supporting the healthcare scientist with studying bacteria, viruses, fungi and parasites ○ working on the prevention and control of epidemics/pandemics **K3.3 The role of CPD in order to develop professional practice and support continuous improvement:** • improving patient care: ○ use of new technologies such as new analysers and kits ○ use of new technologies within genomics • supporting career progression	**S3.40 Contribute to research and innovation within the boundaries of relevant clinical and scientific practice as required:** • support the healthcare science professional • carry out a broad range of tasks under supervision • follow regulatory framework • select different sources to gather information for research purpose • give explanations to others in a clear and unambiguous way • use technical language correctly to aid understanding • organise material coherently to suit length and purpose of writing • express ideas clearly and concisely • use correct terminology and agreed formats • listen actively to contributions of others to support research and innovation • make relevant and constructive contributions to move discussion forward • recognise the difference between fact and opinion • recognise bias to enable individual to work within the boundaries of clinical and scientific practice • contribute to the drafting of standard technical documents for particular sectors using precise terminology and agreed formats • present information using non-digital and digital tools • request clarification where appropriate to support research and innovation • use technology as appropriate to carry out the systematic collection, processing and organisation of data to support research and innovation • demonstrate technical expertise, understanding and skills proficiency across a reasonable range of commonly used devices in order to operate effectively within digitised contexts (GEC1, GEC2, GEC3, GEC4, GEC5, GEC6, GMC5,

Job roles, disciplines and divisions in the processing and analysing of service user specimens	

• maintaining up-to-date practice:
  ○ learning and using new techniques while processing and analysing specimens
  ○ understanding technologies around genomics
• reacting to needs of workforce
 	
K3.4 The techniques within self-reflection and evaluation, including the use of tools and opportunities for undertaking reflective practice:
• reflecting upon specific experiences and situations when analysing and processing:
  ○ working with new specimens
  ○ escalated situations
  ○ working with new SOP
• principle stages of Kolb and Gibbs reflective cycles
• engaging in self-reflection opportunities (for example, team meetings, huddle meetings, workshops)
 	
K3.5 The importance of adhering to the regulatory framework within which research and innovation is conducted by the Health Research Authority (HRA) and Medicines and Healthcare products Regulatory Agency (MHRA):
• ensures good clinical practice
• minimises risks
• ensures research is carried out following ethical principles:
  ○ ensuring informed consent
  ○ ensuring participants are informed about the risks
  ○ safeguarding participants
  ○ ensuring research colleagues are updated accordingly
  ○ protecting participants' confidentiality
• ensures validity of research carried out
 	
K3.6 How the role of the HCSA may contribute to research and innovation within the processing and analysing of specimens:
	GDC1)
	
	S3.41 Recognise the need to refer, and make referrals of service users, to a senior member of the healthcare team:
	• recognise when a task is outside of their scope of practice
	• recognise when to escalate concerns:
	  ○ faulty analysers
	  ○ technical difficulties with specimens
	  ○ sharp injuries
	  ○ unexpected/unusual test results
	• listen actively to contributions of others
	• express opinions and support these with relevant and persuasive arguments
	• give explanations to clinical colleagues and other members of the healthcare team, both orally and in writing, in a clear and unambiguous way to make appropriate referrals
	• use technical language correctly, using graphics and other tools to aid referral
	• speak clearly and confidently using appropriate tone and register that reflects audience and purpose
	• select key information from written text/oral discussions to recognise the need to refer and summarise concisely (orally or in writing) in style appropriate to audience and purpose
	
	(GEC1, GEC2, GEC4, GEC6)

Job roles, disciplines and divisions in the processing and analysing of service user specimens	
• HCSA may assist in the randomisation of clinical trial specimens (for example, use IT to register patients within clinical trial and randomise specimens) • HCSA may update research nurses when results are authorised • use a computer to record results of research in compliance with research project • assist in processing and analysing specimens • process and analyse specimens using newer equipment/procedures and compare with older equipment • participate in audit of newer equipment • discuss the processing and analysis of specimens with senior colleagues **K3.7 How quality assurance, management and improvement links to their associated standards and accreditation bodies:** • quality assurance: o United Kingdom Accreditation Service (UKAS) o Academy for Healthcare Science (AHCS) o Institute of Biomedical Science (IBMS) o National Institute for Health Protection (NIHP) o Health and Care Professions Council (HCPC) • quality management: o International Organization for Standardization (ISO) • quality improvement: o Care Quality Commission (CQC) **K3.8 The job role of a HCSA working in the life sciences in relation to department accreditation:** • following SOPs: o reading and signing SOPs • contributing to writing SOPs • error log reporting	

Job roles, disciplines and divisions in the processing and analysing of service user specimens	
• contributing to audits • adhering to quality indicators and key performance indicators • completing required procedure and devices training • maintaining records of training and CPD • completing competency assessments • HCSAs are more likely to get involved in accreditation within the life sciences than within physiological and physical sciences • maintaining and improving accreditation status • raising corrective and preventative action (CAPA) **K3.9 The functions of the different services within life sciences and the related tests which contribute to investigation, diagnosis and treatment of disease:** • track: o high volume work o fast turnaround time o random access o economies of scale o test examples (full blood count (FBC), liver function test (LFT), electrolytes (sodium and potassium)) • automated: o batch testing o test types (blood group, drug levels, staining, polymerase chain reaction (PCR)) • manual: o rapid testing o test types (culture and sensitivity (C&S), microscopy, POCT, osmometry) **K3.10 Responsibilities of a range of roles within a multi-disciplinary team within the life sciences:** • HSA/lab assistant: o prepares analysers o prepares and processes specimens	

Job roles, disciplines and divisions in the processing and analysing of service user specimens	
○ prepares datasheets ○ disposes of specimens • healthcare science associate: ○ screens specimens ○ reports negative results • biomedical scientist: ○ ensures results are technically correct ○ alerts clinician to abnormal results ○ reports results ○ operational managerial responsibilities • clinical scientist: ○ reports results and provides clinical advice ○ managerial responsibility for department • consultant clinical scientist: ○ provides clinical advice ○ overall responsibility for management of laboratory • consultant medical staff: ○ provides clinical advice ○ has overarching responsibility for the department	
K3.11 There are certain activities which can only be completed by registered professionals: • interpretation of results (only consultant clinical staff do this) • may be able to issue results, as long as it is within scope of practice • only clinical scientists and biomedical scientists can review and issue reports with comments (for example, prescriptions) • exact roles around issuing reports can vary across laboratories	
K3.12 Factors which would dictate when they should seek support and advice from clinical colleagues: • faulty equipment: ○ centrifuge	

Job roles, disciplines and divisions in the processing and analysing of service user specimens	
○ broken pipettes ○ out of calibration analysers/kits • issues with patient specimens: ○ mismatched specimens ○ improperly stored specimens • missing data in IT systems: ○ missing specimen identification data • accidents in the laboratory: ○ sharp injury ○ broken specimens • communication barriers with service users • unexpected test results	

Quality assurance in processing patient specimens	
The student must understand:	The student must be able to:
K3.13 The purpose of the following quality assurance (QA) processes in relation to the processing and analysing of specimens: • audits and audit cycles: ○ ensure high quality service outcomes ○ ensure continuous improvements ○ independent validation of working practices and results, thereof ○ provide benefit to service users, staff and health services • external quality assurance: ○ provides a comparison against other laboratories and nationally established standards ○ enables the laboratory's reporting accuracy to be retrospectively monitored • internal quality assurance: ○ enables the laboratory to do real-time analysis to ensure they are producing accurate results	**S3.42 Support the practitioner in carrying out audits to ensure valid, accurate and reliable data is produced:** • follow audit SOPs • clearly present audit data • contribute to recommendations and CAPA • identify suitable data to comply with audit • collect or generate data to ensure accurate audit • critical interpretation of spreadsheet displays to ensure valid and reliable data is produced • use technology as appropriate to carry out the systematic collection, processing and organisation of data into usable forms (for example, tabular or graphical) in preparation for reporting and/or interpretation • systematically organise and record data, prior to any scaling or processing that may be required in the audit process • make relevant and constructive contributions to move discussion forward to support audit

Quality assurance in processing patient specimens	
○ enables the laboratory to reduce and correct any issues ○ improves quality • internal quality controls: ○ to enable the laboratory to detect, reduce and correct deficiencies before release of service user results ○ statistics of audit analysis ○ statistics are produced from the audit in order to analyse and present quality improvement data **K3.14 How data is accurately presented and transferred within clinical laboratory environments using a range of IT systems:** • use of laboratory information management system (LIMS): ○ processes and reports laboratory data within pathology disciplines ○ secure access (for example, different levels of access) ○ standardised reporting (for example, content, format and how report is written) ○ automated results reduce any transcription errors ○ ensures compliance with UK GDPR, Caldicott principles, good laboratory practice (GLP) and good clinical practice (GCP) ○ analysers interfaced with LIMS for patient data transfer results ○ system backups within laboratory • connectivity to hospital information system (HIS): ○ automated transfer of data to other healthcare professionals ○ secure access (for example, different levels of access) ○ direct link to patient records ○ ensures compliance with UK GDPR, Caldicott principles and GCP ○ hospital backups	• express ideas clearly and concisely • provide the appropriate level of detail to reflect audit purposes • listen actively to contributions of others • ask and respond to questions for clarification • use technical language correctly, using graphics and other tools to aid understanding • use mathematic processes to support technical arguments and communicate effectively to a range of stakeholders • demonstrate an understanding of working with very large and very small numbers • organise ideas logically and coherently to support audit • demonstrate a secure level of competence and confidence in the use of digital devices, which allows them to select, configure, use, manage and evaluate relevant technology as part of their standard level of operational functionality (GEC1, GEC3, GEC6, GMC1, GMC2, GMC4, GMC5, GMC8, GDC1) **S3.43 Adhere to all required QA procedures to ensure valid, accurate and reliable data is produced:** • follow relevant SOPs • adhere to internal quality controls • read, understand and synthesise data to suit audience and purpose • present information and ideas orally using non-digital and digital tools • select different sources to gather information • identify suitable data to comply with QA procedures • collect or generate data to ensure accurate QA procedures are followed • demonstrate an understanding of the accuracy or precision that is required when adhering to QA procedures • demonstrate an understanding of working with very large and very small numbers • use technology as appropriate to carry out the systematic collection, processing and

Quality assurance in processing patient specimens	
	organisation of data into usable forms (for example, tabular or graphical) in line with QA procedures • systematically organise and record data prior to any scaling or processing that may be required in the QA process • reason with mathematics, communicate this clearly and draw conclusions that are persuasive within the problem situation • process, interpret and apply data accurately (GEC2, GEC5, GMC1, GMC2, GMC5, GMC8, GDC4)

Receiving, handling and storage of samples for processing and subsequent disposal	
The student must understand:	The student must be able to:
K3.15 The process for ensuring the correct specimen has been received, both electronically and using paper forms: • electronically: o check label and request form o scan specimen label which provides information about the specimen • paper forms: o check label and request form o lab would label sample and form with a pre-printed label with the same code so they can match the sample to the form o sample would then be requested manually through lab IT systems	**S3.44 Check the suitability and quality of all samples received, adhering to local guidelines:** • identify leaking samples • identify incorrectly labelled samples • identify expired samples • identify incorrectly stored samples • identify old samples delayed in being sent to the lab • ask questions to test understanding (GEC1)
K3.16 The procedures to follow when samples are incorrectly labelled or packaged: • if packaging is damaged, consider opening package following category 3 procedures • if specimen is incorrectly labelled: o inform sender that specimens are incorrectly labelled o request repeat samples	**S3.45 Demonstrate the ability to determine if samples received are of a sufficient quality to permit processing:** • follow SOPs to check sample suitability • ask questions to test understanding (GEC6) **S3.46 Follow procedures if samples are deemed not suitable, for example, if samples are leaking they should be discharged and disposed of appropriately:** • follow SOPs relating to specimen disposal • follow relevant infection control procedures

Receiving, handling and storage of samples for processing and subsequent disposal

- sender determines if specimen has been mismatched or sent elsewhere
- reject samples, but retain and label samples until repeat samples are received
- issue report to keep record of mismatched specimen

K3.17 The procedures to follow when samples are leaking:

- precious sample (for example, spinal/joint fluid, tissue biopsies):
  - notify biomedical scientist
  - use appropriate PPE
  - use prepared tray for leaking specimens
  - clean specimen container with disinfectant
  - secure lid/close container
  - place rider comment mentioning that the specimen was leaking upon receipt
  - specimen would then be processed immediately
- non-precious (for example, saliva):
  - contact ward and ask if sample can be taken again
  - if patient is taking certain medications (for example, antibiotics), leaking sample may have to be processed (clinical scientist or consultant would make this decision)
  - if sample is being processed, precious sample process would be followed
  - if sample is not being processed, sample would be discarded, and report would be issued requesting a new sample

K3.18 The procedures to follow when the time or temperature range of specimens has not been followed:

- inoculated blood culture bottles incubated at 37 degrees Celsius should not be refrigerated, if blood culture is refrigerated:
  - HCSA must inform microbiology upon discovery
- ask questions to test understanding

(GEC6)

S3.47 Use IT systems to record details of samples received:

- follow SOPs relating to the recording of sample details
- ensure they are adequately equipped to maintain:
  - safety
  - security
  - privacy
- when obtaining and recording information, demonstrate an understanding of the patient's:
  - digital rights and responsibilities
  - current practices relating to data collection and use (and its defining influence upon individual lives and the world around them)
- demonstrate a secure level of competence and confidence in the use of digital devices and media which allows them to select, configure, use, manage and evaluate relevant technology
- demonstrate an understanding of the language of the digital devices and technology that they use

(GDC1, GDC5, GDC6)

S3.48 Handle all samples with care and respect:

- follow regulations for the handling and disposal of samples
- use appropriate procedures in relation to precious and non-precious specimens to enhance patient care
- recognise and understand cumulative errors and the effect that errors in measurement have on subsequent specimen collections when not handled with care and respect
- read, understand and synthesise information to support care and respect when handling samples
- ask and respond to questions for clarification for safe handling of samples

Receiving, handling and storage of samples for processing and subsequent disposal	
○ details must be recorded into IT systems, as this may impact culture results • plasma/serum/blood/urine/swab: ○ relatively stable, may not have to always be refrigerated ○ after 7 days of storage, samples would be discarded **K3.19 The purpose of specific regulations, policies and organisations which impact specimen storage and disposal:** • Human Tissue Act 2004: ○ regulates the removal, storage, use and disposal of human bodies, organs and tissue • Human Tissue Authority (HTA) Codes of Practice: ○ this code and the sector-specific codes aim to provide anyone undertaking activities relevant to each sector with a reference source which gives practical advice on the minimum steps necessary to comply with the relevant legislation and HTA policy • Royal College of Physicians (RCP): ○ the retention and storage of pathological records and archives/specimens • local healthcare (clinical) waste policy: ○ set up to contextualise waste policy to individual settings and make sure this is maintained • management of medical equipment: ○ guidance for healthcare and social service organisations on handling medical devices in practice • disposal process, requirements and documentation: ○ set up to provide clear guidance for the disposal of specimens **K3.20 How to ensure all specimen storage requirements are met:** • ensure minimum/maximum temperatures are maintained • ensure storage duration requirements are	(GEC5, GEC6, GMC1) **S3.49 Adhere to storage requirements for samples:** • follow SOPs for sample storage • store samples with the appropriate temperature requirements • store samples in relation to regulations • request clarification where appropriate for storage requirements • read, understand and synthesise information in relation to storage requirements (GEC4, GEC5) **S3.50 Dispose of all specimens and tissue samples in line with regulations:** • follow regulations in relation to disposal of specimens • dispose of waste using appropriate waste streams • select different sources to gather information regarding the disposal of specimens • read, understand and synthesise information in accordance to the disposal of specimens (GEC5)

Receiving, handling and storage of samples for processing and subsequent disposal	
adhered to • identify old specimens delayed in being sent to the lab – after 8 hours, some tests are no longer suitable • follow appropriate SOPs for storage requirements and rotation • follow MHRA requirements • record specimens collected in LIMS: o log against patient data, match with laboratory tests by specialism • identify preservatives required: o formaldehyde o anticoagulants • ensure correct storage methods used for specimens: o fridge o freezer o tissue bank o controlled room temperature cabinets	

Laboratory equipment used in the processing of specimens	
The student must understand:	The student must be able to:
K3.21 The functions of a range of laboratory equipment used in the processing of specimens: • centrifuges: o separate blood into components • balances: o weighing scales • automated analysers for blood/fluids/urine: o analyses samples o used for multiple tests (for example, full blood test, renal/liver profiles, tumour markers) • light microscope: o magnifies tissue specimens and blood	**S3.51 Use a range of pieces of routine laboratory equipment to process service user specimens:** • equipment: o balances o microscope o centrifuge o pH metre o automatic pipette • process, interpret and apply data accurately for patient specimens, understanding the nature, type, quality and reliability of the laboratory equipment being used • demonstrate technical expertise,

Laboratory equipment used in the processing of specimens	
films • pH metre: o measures pH • microtome: o cuts thin sections of tissue so can be looked at under microscope • spectrophotometer: o shines light of various wavelengths through a sample and measures absorbance • high performance liquid chromatography (HPLC): o separation of blood into all its separate components • automatic pipettes: o dispensing of small volumes of liquids/specimens o single-channel and multi-channel • polymerase chain reaction (PCR) machine: o amplification of DNA samples to produce millions of copies of a target sequence o detection of disease and genetic disorders o pathogen identification	understanding and skills proficiency across a reasonable range of commonly used devices in order to operate effectively within digitised contexts (GDC1, GDC4, GDC5) **S3.52 Calibrate a range of equipment used in the processing and analysing of specimens in line with manufacturer instructions:** • equipment: o manual pipette o pH metre o balances • understand issues concerning the calibration of instruments • demonstrate an understanding of the accuracy and precision that is required in calibration of equipment • apply skills with confidence and fluency to solve technical problems • have a secure level of competence and confidence in the use of digital devices, including the ability to select, configure and use devices related to the calibration of equipment (GMC1, GMC2, GDC1)
K3.22 When calibration may be required for processing and analysing equipment: • annual calibration of all equipment as a minimum • frequent (daily/weekly) calibration of analysers as determined by kits or when quality control is outside accepted limits • frequent calibration for equipment prone to calibration drift: o pipettes o scales • power outages lead to a need for calibration for some equipment: o analysers o matrix-assisted laser desorption/ionization (MALDI) • record calibration carried out	**S3.53 Maintain a range of equipment used in the processing and analysing of specimens to ensure it is fit for use:** • run self-cleaning cycles on analysers • wipe equipment and surrounding bench spaces daily • run self-checks on analysers • replace consumables and reagents/cartridges linked to analysers while following manufacturer instructions • apply skills with confidence and fluency to solve technical problems • have a secure level of competence and confidence in the use of digital devices, including the ability to select, use, manage and evaluate devices, ensuring equipment is fit for use (GMC2, GDC1)

Laboratory equipment used in the processing of specimens	
K3.23 How to maintain equipment within daily and weekly maintenance cycles: • clean and replace components (for example, cuvettes) • wipe analyser casing with mild disinfectant • run self-cleaning cycles on all analysers (biomedical scientist would replace tubes if necessary) • replace consumables and reagents linked to equipment (for example, cartridges) • record maintenance carried out **K3.24 What to do if equipment is found not to be fit for purpose:** • follow appropriate operating procedure (for example, troubleshoot equipment) • rectify where possible (for example, clean/sterilise or restart equipment) • calibrate analysers using manufacturer instructions where appropriate • if equipment cannot be fixed: o ensure it is taken out of service o escalate promptly and appropriately (for example, to manufacturer for repairs) o log according to organisational procedure **K3.25 How to calibrate laboratory equipment:** • calibrate manual pipette using a balance and the density of water: o undertake mathematics behind calibrating pipette o take required measurements and check against acceptable tolerances • calibrate pH metre: o undertake mathematics behind calibrating pH metre o take required measurements and check against standards • calibrate balances: o using calibration weights o using internal calibration button	

Underlying principles of techniques used in the processing of specimens	
The student must understand: **K3.26 The underlying principles of techniques used in the processing of specimens while using light microscopy techniques:** • device uses visible light and system of lenses to magnify images that could not been seen by the naked eye • cell counts using haemocytometer • staining techniques for cells and bacteria (Gram stains, Giemsa stain) • hematoxylin and eosin (H&E) stain for tissues **K3.27 The underlying principles of techniques used in the processing of specimens while using separation techniques:** • analytical chromatography: o components in a mixture are separated out into their various components in a liquid/gas using paper/gel/column • electrophoresis: o charged molecules are separated on a gel/in a capillary according to their size/charge when an electrical field is applied • immunological techniques: o direct assay techniques (for example, electrochemical immunoassay enzyme-linked immunosorbent assay (ELISA)) **K3.28 The underlying principles of techniques used in the processing of specimens while using quantitative analysis:** • photometry (for example, spectrophotometry, colourimetry, turbidimetry): o technique is based on the amount of light absorbed by coloured compounds and use of compounds of known concentrations o possible to analyse unknown mixtures against 'standard curves' • flow cytometry:	The student must be able to: **S3.54 Apply knowledge of underlying principles of microscopy techniques used in the processing of samples to ensure that samples are processed effectively, to obtain the most accurate results possible:** • use Giemsa and Gram staining techniques • undertake cell counts • demonstrate an understanding of the accuracy and precision that is required in microscopy techniques • use knowledge of microscopy techniques in context to process samples • use specialist notation/representation to reflect clinical standard practice • understand that microscopy techniques for data processing procedures and outputs should be interrogated and interpreted critically against principle knowledge • ask and respond to questions for clarification around microscopy techniques (GEC6, GMC1, GMC2, GMC6) **S3.55 Apply knowledge of underlying principles of separation techniques used in the processing of samples to ensure that samples are processed effectively, to obtain the most accurate results possible:** • undertake ELISA techniques • undertake chromatography • demonstrate an understanding of the accuracy and precision that is required in separation techniques • use knowledge of separation techniques in context to process samples • use specialist notation/representation to reflect clinical standard practice • understand that separation techniques for data processing procedures and outputs should be interrogated and interpreted critically against principle knowledge • ask and respond to questions for

Underlying principles of techniques used in the processing of specimens	
○ technique used to detect and measure physical and chemical characteristics of a population of cells or particles • mass spectroscopy: ○ basic principle for this technique is that a stream of charged particles is deflected by a magnetic field ○ the amount of deflection depends on the mass and the charge of the particles in the specimen	clarification around separation techniques • demonstrate technical expertise, understanding and skills proficiency across a reasonable range of commonly used devices in order to operate effectively within digitised contexts (GEC6, GMC1, GMC2, GMC6, GDC1) **S3.56 Apply knowledge of underlying principles of quantitative techniques used in the processing of samples to ensure that samples are processed effectively, to obtain the most accurate results possible:** • undertake spectrophotometry • understand the accuracy and precision that is required in quantitative techniques • recognise and understand cumulative errors and the effect that errors in measurement have on the accuracy of the results • use knowledge of quantitative techniques in context to process samples • use specialist notation/representation to reflect clinical standard practice • understand that quantitative techniques for data processing procedures and outputs should be interrogated and interpreted critically against principle knowledge • ask and respond to questions for clarification around quantitative techniques • demonstrate technical expertise, understanding and skills proficiency across a reasonable range of commonly used devices in order to operate effectively within digitised contexts (GEC6, GMC1, GMC2, GMC6, GDC1)

Techniques and specimens to be processed	
The student must understand:	The student must be able to:
K3.29 The domains of good scientific practice that must be followed when processing urine	**S3.57 Undertake specimen processing using appropriate techniques and following**

Techniques and specimens to be processed	
samples: • daily maintenance of urine analyser: o domain 2.2 – technical o domain 2.3 – quality • specimen reception: o domain 1.1 – professional practice o domain 1.2 – probity o domain 1.3 – working with colleagues • numbering and data entry of urines: o domain 1.2 – probity o domain 2.2 – technical • aliquoting of urine for urine analyser: o domain 2.2 – technical • screening of urine: o domain 2.1 – scientific practice o domain 2.3 – quality • releasing of negative results: o domain 2.1 – scientific practice • culturing positive urines: o domain 2.2 – technical • storing urines: o domain 2.2 – technical • cleaning work surfaces: o domain 2.2 – technical	**SOPs, including appropriate infection prevention control and health and safety requirements:** • undertake specimen processing using techniques outlined in SOPs • identify and adhere to the nature, type and quality of the SOPs' information for specimen processing • develop the skills, tools and platforms which enable them to undertake specimen processing • select different sources to gather information relating to health and safety and infection control regulations • read, understand and synthesise information in accordance with health and safety and infection control regulations • demonstrate an understanding of the accuracy and precision that is required in specimen processing (GEC5, GMC1, GDC2, GDC5)
K3.30 The importance of adhering to SOPs when processing and analysing specimens: • increased reliability • increased safety • increased knowledge and understanding • consistent approach between users • quality assurance • not following SOPs could lead to erroneous results • not following SOPs could lead to dismissal	

Techniques and specimens to be processed	

K3.31 Infection prevention techniques for processing specimens:
• categorisation of pathogens (causative agents) and hazard groups:
  ○ use of appropriate PPE in relation to categorisation
  ○ all specimens should be treated as though they are high risk
  ○ handwashing
  ○ sterilisation and disinfection procedures (for example, use of autoclave)
  ○ prevention of blood-borne viruses
  ○ appropriate disposal of specimens
  ○ appropriate access levels for laboratories
  ○ appropriate rest room and changing facilities for staff
  ○ containment levels (for example, appropriate safety cabinet use)
 	
K3.32 The advantages of automation within the processing and analysing of specimens:
• faster turnaround time
• consistent results
• quicker patient diagnosis and treatment
• increased staff capacity
• economies of scale
• audit trail	

Specimen details and results from specimen processing	
The student must understand: **K3.33 The process of recording of specimen details into laboratory information management system (LIMS):** • specimen barcodes are scanned from HIS • patient details are displayed and cross-	The student must be able to: **S3.58 Record results and data obtained from specimen processing:** • accurate processing of results • follow SOPs to record results • use appropriate grammar and choice of

Specimen details and results from specimen processing	
referenced to patient details in LIMS • if it is a new patient, patient data will be added to LIMS • add specimen to LIMS **K3.34 The process of recording research/clinical trial data into LIMS:** • if the specimen is a clinical trial, there will be no link to HIS • specimen will have a randomised number • if the specimen has been randomised prior, add specimen to LIMS replacing the surname with the randomised number • if it has been randomised in the laboratory, may have to add details via HIS and add randomised number in brackets; this would then be added to LIMS **K3.35 How to handle large data sets received from specimen processing:** • ensure each data set is reviewed and managed appropriately • transfer data to appropriate format (for example, paper, electronic) • ensure additional tests on specimens are assigned • store data set in appropriate area and store specimens **K3.36 Common types of enquiry relating to specimen results:** • clinicians calling to see if results are ready • clinicians calling to add tests to previous samples • service user calling to see if their results are ready **K3.37 How to follow UK GDPR policy and Caldicott principles when receiving enquiries in relation to results:** • person taking enquiry must take identification of all service users making enquiries (for example, GP code numbers, ward numbers)	vocabulary and correct spelling and punctuation • provide the appropriate level of detail to reflect collection of sample • proofread texts, applying agreed workplace practices to ensure data accuracy • provide supporting documentation in different formats depending upon samples required • systematically organise and record data prior to processing that may be required • demonstrate an understanding of the accuracy and precision that is required in specimen processing • evaluate a variety of information as part of digital communication, with a differentiated range of purposes and audiences (GEC1, GEC2, GEC3, GMC1, GMC5, GDC3) **S3.59 Present data associated with results from processing specimens in appropriate formats for handover to team members:** • make data clear and presentable • make sure data is accurate • use appropriate grammar and choice of vocabulary and correct spelling and punctuation • use technical language correctly using graphics and other tools to aid understanding • present data using non-digital and digital tools • proofread texts, applying agreed workplace practices to ensure data accuracy • provide supporting documentation in different formats depending upon samples required • demonstrate an understanding of how data is presented by a range of visual/graphical displays • understand that graphical data may require the identification and validation (using technology) of mathematical functions to appropriately model the data • use mathematical processes to support technical arguments and communicate

Specimen details and results from specimen processing	
• if HCSA is unable to confirm identity of service user, they will take contact details and contact them back • person who has requested test (for example, nurse, doctor) are the only ones who are able to receive laboratory results • call would be logged manually or within patient records	effectively with a range of stakeholders • give handovers to team members, both orally and in writing, in a clear and unambiguous way, taking into account the level and experience of the audience and the purpose (GEC1, GEC2, GEC3, GMC6, GMC8) **S3.60 Demonstrate the ability to deal with laboratory enquiries and to understand clinical governance when releasing information:** • follow UK GDPR policy when releasing information • only release information when it is appropriate • ensure they are adequately equipped to maintain safety, security and privacy • when handling laboratory enquiries, demonstrate an understanding of the patient's digital rights and responsibilities • follow current practices relating to laboratory enquiries • read, understand and synthesise information to demonstrate the ability to deal with laboratory enquiries • evaluate a variety of information as part of digital communication, with a differentiated range of purposes and audiences (GEC5, GDC3, GDC5)

Section 5: TQ glossary

TQ specification

Student

The person studying the technical qualification (‘The student must…’).

Tutor

The individual delivering the technical qualification.

Provider

The centre delivering the technical qualification.

Series

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

Assessment mode

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

Section 6: Additional information

Annual monitoring visits

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

Guided learning hours (GLH)

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

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

Total qualification time (TQT)

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

Total qualification time comprises:

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

Essential skills

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

- appropriate workplace behaviour and dress
- appropriate interpersonal skills
- communicating with professional colleagues/peers and/or hierarchical seniors
- supporting other aspiring employees
- personal manners
- understanding work practices and how different roles and departments function within an organisation

Recognition of prior learning (RPL)

Recognition of prior learning may be applied to the core component only.

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

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

Qualification dates

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

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

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

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

Staffing requirements

Providers delivering any of our qualifications must:

- have a sufficient number of appropriately qualified/experienced tutors to deliver the technical qualification to the volume of students they intend to register
- ensure that all staff involved in delivery are provided with appropriate training and undertake meaningful and relevant continuing professional development
- implement effective processes to ensure all delivery is sufficient and current. This should include standardisation to ensure consistency of delivery
- provide all staff involved in the delivery process with sufficient time and resources to carry out their roles effectively

Core staffing requirements

Staff involved in the delivery of the core component must be able to demonstrate that they have (or are working towards) the relevant occupational knowledge and/or occupational competence in healthcare science, at the same level or higher as the qualification being delivered. This may be gained through experience and/or qualifications.

Occupational specialism staffing requirements

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

Resource requirements

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

General:

- computer
- internet access
- audio/visual recording equipment

Occupational specialism: Optical Care Services:

Providers must ensure that they can recreate an optical environment sufficient to meet the needs of students demonstrating the skills outlined in the content, including:

- simulated retail area:
    - clock
    - counter space
    - desktop computer/laptop
    - individual acting as the patient
    - notepad
    - system for taking payments
    - triage form
    - waste bin
- screening area:
    - alcohol gel
    - Amsler grid
    - auto-keratometer:
        - wipeable headrest
        - adjustable chinrest
        - removable chinrest paper or wipeable surface
        - operator screen
        - function buttons
        - print, clear, setting functions
        - unlocking function
        - fixation target
        - joystick with non-automatic function
    - automated focimeter:

- screen
- function buttons
- print, clear, setting functions
- nose piece
- claw grip
- bar to keep spectacles straight
- handle to move bar
- power templates
- power progressive lense template

- automated perimeter:
  - wipeable headrest
  - adjustable chinrest
  - wipeable clicker
  - disposable/wipeable eye patch
  - function button for lights
  - fixation point
  - all modes for testing: 24/2, macula screening, glaucoma clip, glaucoma threshold, Esterman screening, macula threshold
- automated refraction system:
  - wipeable headrest
  - adjustable chinrest
  - removable chinrest paper or wipeable surface
  - operator screen
  - function buttons
  - print, clear, setting functions
  - unlocking function
  - fixation target
- joystick with non-automatic function
- detachable stand for lens ADD
- disposable chin rest papers
- disposable sanitising wipes
- eye patch
- fundus camera***:**
  - wipeable headrest

        - adjustable chinrest
        - removable chinrest paper or wipeable surface
        - operator screen
        - function buttons
        - print, clear, setting functions
        - unlocking function
        - fixation target
    - general waste bin
    - green waste bin
    - clinical waste box
    - hypoallergenic tissues
    - lenses for add on machine
    - OCT machine and lenses*****
        - wipeable headrest
        - adjustable chinrest
        - removable chinrest paper or wipeable surface
        - operator screen
        - function buttons
        - print, clear, setting functions
        - removable lenses
    - table and patient chair (must be adjustable)
    - tonometer (contact and non-contact)
    - ABDO-approved mannequin head

***** It is not mandatory for providers to acquire this equipment, but students must have access to it as part of delivery and assessment.

Please note: training versions of equipment are permitted, so long as the criteria referenced for each of the above pieces of equipment are met, and that they reflect a realistic user experience, allowing for a valid assessment of the use of the equipment when required. An example would be that of Zeiss, who make Humphrey visual field machines but offer a training version of this machine, with simplified functions and simulated tests.

- dispensing area:
    - desk and chairs
    - display equipment – at least 4 frame bars to display the 40 frames
    - individual acting as the patient
    - frames:

        - 40 frames in a range of styles, sizes and colours – to include plastic, metal, supra and full frames, traditional ladies, gents, unisex and contemporary styles (at least 5 of which meet the criteria required by the service user requirement of 'trendy')
    - laboratory order form
    - lens demonstration aids
    - lenses:
        - varifocal (basic, premium and mid-range)
        - bifocal
        - single vision
        - occupational
        - high index/thinner lenses
        - anti-reflection coating
        - photochromic
        - tints
    - marking up pen, frame ruler and pupillometer
    - mirrors – wall mounted or large desk mirror and a hand mirror with magnification
    - power progressive lens template
    - sample NHS forms
    - selection of consumables (for example, contact lens solution, lens wipes)
    - spectacle prescription form
- adjustment area:
    - automatic focimeter
    - blank job verification form to record measurements checked
    - British Standards, including access to a minimum of the following sections:
        - BS 2738-3:2004+A1:2008 Spectacle lenses. Specification for the presentation of prescriptions and prescription orders for ophthalmic lenses
        - BS EN ISO 21987:2017 Ophthalmic optics. Mounted spectacle lenses
        - BS EN 166:2002 Personal eye protection. Specifications
        - BS EN ISO 13666:2019 Ophthalmic optics. Spectacle lenses. Vocabulary
        - BS 3521-2:1991 Terms relating to ophthalmic lenses and spectacle frames. Glossary of terms relating to spectacle frames
        - BS EN ISO 8624:2020 Ophthalmic optics. Spectacle frames. Measuring system and vocabulary
        - BS EN ISO 12312-1:2013+A1:2015 Eye and face protection. Sunglasses and related eyewear. Sunglasses for general use
    - cleaning cloths and solutions
    - desk and chairs

- hand sanitiser
- lens cleaning products
- spectacle frame spares:
  - nose pads
  - screws, including self-tapping screws
  - end tips
  - supra cord and ribbon
- tools:
  - frame heater
  - frame ruler
  - file
  - pliers:
    - double nylon jaw pliers
    - angling pliers
    - snipe nose pliers
    - cutter pliers
    - nose pad pliers
    - axis pliers
  - screwdriver set, including cross-head and flat-head
  - screw sizer

Occupational specialism: Assisting with Healthcare Science:

Students must have access to the appropriate resources required to complete the case study assessment. These include the following:

- a computer
- word processing software (for example, Microsoft Word)
- a simulated consultation room to include:
  - patient bed
  - a simulated patient toilet area in a separate room
  - hand wash basin
  - desktop computer
  - a clock
- person(s) to enact the role of:
  - the patient
  - respiratory team lead scientist

  - practitioner as part of a multi-disciplinary team
  - the biomedical scientist
- responsive manikin (physiological measurements)
- manual blood pressure measurer (sphygmomanometer)
- a range of cuff sizes for the sphygmomanometer
- cuff connectors
- stethoscope (including a range of earpieces)
- PPE:
  - a laboratory coat (if no uniform is provided)
  - aprons
  - masks
  - gloves
  - safety spectacles
- cleaning products, bed roll, paper towels, disinfectant and hand sanitiser
- clinical waste bins (colour coded) midstream urine collection kit, including 2 containers (1 x plain sterile universal container, 1 x boric acid sterile universal container)
- POCT kit (urine dipstick):
  - glucose
  - ketone
  - protein
  - pH
  - red blood cells
  - white blood cells
- blood glucose POCT device including glucose test strips, QC solution (high and low)
- blood glucose POCT finger prosthesis contained with simulated blood material and suitable lance
- cleansing wipes
- specimen collection equipment and tray
- specified simulated urine liquid, blood, plasma, faecal
- specimen labels and specimen transport bags
- labels
- sharps box
- clipboard and pen
- a simulated laboratory to include:
  - cold storage simulated to appear between 2 to 8°C

- incubator at 37°C
- autoclave
- glass/plastic jar for tip disposal
- handwashing facilities
- decontamination tools and materials
- NCFE provided SOPs
- frosted microscope slides
- forceps to hold slides
- sink with tap
- slide staining rack
- microscope with 100x and oil immersion lens, slides and cover slips
- immersion oil
- microscope wipes
- slide labels and/or pencil
- sterile inoculating loops
- sterile distilled water
- hot plate to fix slides
- agar plates and growth media
- Gram staining reagents kit to include:
  - distilled water in bottle
  - crystal violet
  - Gram iodine solution
  - Gram's differentiator (require safe store as this is flammable)
  - safranin
- Giemsa stain kit
- Pasteur pipettes
- alcohol wipes
- blood sample tubes
- transport bags
- specimen labels
- automatic pipettes dispensing 20 to 200 µl and 1000 µl
- corresponding automatic pipette tips for 20 to 200 µl (yellow) and 1000 µl (blue)
- tubes and racks
- 96 well plates

- simulated ELISA test kits
  - simulated wash buffer
  - simulated assay buffer
  - simulated detection antibody solution
  - simulated standard solution (positive control)
  - simulated negative control
  - simulated stop solution
  - 96-well plate (simulated to be pre-coated with antibody)
- computer with NCFE provided LIMS spreadsheet
- marker pens
- peak expiratory flow meter and mouth pieces
- spirometer, mouth piece and bacterial filter
- ECG pads, electrodes and leads
- ECG gel
- thermometer with tips
- pulse oximeter
- pregnancy tests
- chromatography kit
- balances
- centrifuge
- pH metre
- bacteria samples
- haemocytometer and cover slips
- resources to maintain privacy and dignity
- ketone meter
- ketone strips
- tourniquet
- white blood cell counting solution
- red blood cell counting solution (1 x PBS)

Customer support team

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

Fees and pricing

Fees will be made available to eligible and approved providers.

Training and support for providers

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

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

The variety of support available includes:

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

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

Useful websites and sources of information

Core component

Health and Safety Executive (HSE): www.hse.gov.uk/

Health and Care Professions Council (HCPC): www.hcpc-uk.org/

General Dental Council (GDC): www.gdc-uk.org/

General Pharmaceutical Council (GPhC): www.pharmacyregulation.org/

General Optical Council (GOC): www.optical.org/

Care Quality Commission (CQC): www.cqc.org.uk/

General Medical Council (GMC): www.gmc-uk.org/

Occupational specialism: Optical Care Services

Association of British Dispensing Opticians (ABDO): www.abdo.org.uk

Association of Contact Lens Manufacturers (ACLM): www.aclm.org.uk

Association of Optometrists (AOP): www.aop.org.uk

British Contact Lens Association (BCLA): www.bcla.org.uk

College of Optometrists: www.college-optometrists.org

Federation of (Ophthalmic and Dispensing) Opticians (FODO): www.fodo.com

Optical Confederation: www.opticalconfederation.org.uk

Optical Suppliers Association (OSA): www.osa-uk.co.uk

Occupational specialism: Assisting with Healthcare Science

NHS Digital: digital.nhs.uk/about-nhs-digital

NHS Leadership Academy: www.leadershipacademy.nhs.uk/resources/healthcare-leadership-model/

NHS Long Term Plan: www.longtermplan.nhs.uk/

National School of Healthcare Science (NSHCS): nshcs.hee.nhs.uk

Academy for Healthcare Science (AHCS): www.ahcs.ac.uk

NHS health careers: www.healthcareers.nhs.uk/explore-roles/healthcare-science

United Kingdom Accreditation Service (UKAS): www.ukas.com/about/

Improving Quality in Physiological Services (IQIPS): www.ukas.com/services/accreditation-services/physiological-services-accreditation-iqips/

UKAS The Route To Accreditation: www.ukas.com/the-route-to-accreditation/

Health and Care Professions Council (HCPC): www.hcpc-uk.org/standards/

Institute of Biomedical Science (IBMS): www.ibms.org/education/training-laboratory/

Institute of Physics and Engineering in Medicine (IPEM): www.ipem.ac.uk/AboutIPEM.aspx

IBMS High quality staff deliver high quality services: www.ibms.org/resources/news/high-quality-staff-deliver-high-quality-services/?mc_cid=b95fd36e0e&mc_eid=68b347bbec

HSE publications

Health and safety and risk assessment toolbox: www.hse.gov.uk/toolbox/index.htm

Advisory Committee on Dangerous Pathogens (ACDP):

- www.hse.gov.uk/pubns/infection.pdf
- www.hse.gov.uk/pubns/misc208.pdf
- www.hse.gov.uk/biosafety/management-containment-labs.pdf

Blood-borne viruses in the workplace: www.hse.gov.uk/pubns/indg342.htm

Safe working in clinical laboratories: www.hse.gov.uk/pubns/clinical-laboratories.pdf

Transportation of infectious substances: www.hse.gov.uk/biosafety/blood-borne-viruses/transportation-of-infectious-substances.htm

Medicines and Healthcare products Regulatory Agency (MHRA): www.gov.uk/government/organisations/medicines-and-healthcare-products-regulatory-agency

National Institute for Health Research (NIHR): www.nihr.ac.uk

Learning resources

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

- schemes of work
- tutor delivery guides

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

Equal opportunities

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

Diversity, access and inclusion

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

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

The most up-to-date version of the policy can be found on the NCFE website where providers can find details of how to request a reasonable adjustment or special consideration.

Contact us

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Version 3.0 19 June 2023

Document information

The T Level Technical Qualification is a qualification approved and managed by the Institute for Apprenticeships and Technical Education. NCFE is currently authorised by the Institute to develop and deliver the T Level Technical Qualification in Healthcare Science.

Owner: Qualifications Development Manager

Change History Record

Version	Description of change	Approval	Date of Issue
v1.0	Post approval, updated for publication.		January 2021
v1.1	Updates to Sections 1 (Institute reference: ODSR_HS_002-ODSR_HS_004)		March 2021
v1.2	Updates to Section 4 and Section 6 (Institute reference ODSR_HS_005 and ODSR_HS_006)		April 2021
v.1.3	Branding updated Updates to Sections 1, 2 and 4 (Institute reference ODSR_HS_008- ODSR_HS_018, ODSR_HS_021 and ODSR_HS_023)		September 2021
v2.0	Updated following approval of the Optical Care Services occupational specialism		October 2021
v2.1	Updated title of personal protective equipment regulations to correct version (1992) (Institute reference ODSR_HS_018	November 2021	January 2022
v2.2	Updates to terminology, concepts and assessment requirements (ODSR_HCS_071-074)	December 2021	March 2022

v2.3	Update to English and Mathematics exit requirements (ODSR_HS_75, 76, 78) Added temporary flexibilities for industry placements (ODSR _HS_77) Minor update to clarify resource requirements (ODSR_HS_83) Further clarification to content in Section 4 / Section B (ODSR_HS_TBC) Minor updates to terminology (ODSR_HS_79, 86)	June 2022	January 2023
v3.0	The following amendments have been made to this qualification specification following annual review. **General changes:** • clarification provided regarding registering students on T Levels and transferring between T Levels and occupation specialisms • updated assessment information • updated grading tables and grade descriptors • providing additional websites and sources of information to support with delivery • legislations, regulations and acts have been added and dates updated, where applicable • training and support for providers information has been updated • glossary definitions have been updated, including patient and service user • resource requirements section updated to specify that 'providers must ensure that the student has access to the necessary materials, resources and workspaces for delivery and assessment of mandatory knowledge and skills. The following lists are not exhaustive' • resource lists have been updated • throughout both the core component and occupational specialism sections, reference to 'causative agents' has been updated to 'pathogens (causative agents)' • any reference to GDPR has been updated to UK GDPR **Amendments made to the core component section:** • in B1.14, reference to 'nucleotides are the	May 2023	19 June 2023

	molecules from which DNA and RNA are formed' has been amended to 'nucleotides are the molecules (monomers) from which DNA and RNA are formed' • in B1.18, 'a spontaneous change in the DNA sequence can lead to genetic variations' has been amended to 'a mutation (spontaneous change in the DNA sequence) can lead to genetic variation' • in B1.24, reference to 'an organism replicating inside the body, resulting in disease' has been amended to a 'a microorganism replicating inside the body, resulting in disease' • in B1.32, 'role of vaccinations in relation to T and B memory cells' has been added as an additional bullet point • in B1.39, reference to 'activation energy' has been added to 'molecules must collide with enough energy to break and reform bonds' • in B1.41, 'principles of reaction kinetics Maxwell-Boltzmann distribution curve' has been added as sub bullet point • in B1.51, in 'the shape and direction of the magnetic field around bar magnets, and the relationship between the strength of the field and concentration of lines', reference to 'lines' has been updated to 'field lines' • in B1.56, reference to 'X-rays' has been amended to 'X-rays for imaging', and 'cleaning computer equipment' has been amended to 'cleaning laboratory equipment' • in B2.4, reference to 'muscles functioning as antagonist pairs' has been broken down into a separate bullet point • in B2.12, 'weight' has been added as a sub bullet to 'factors that contribute to measurements of normal parameters' • in B2.14, reference to 'nervous disorders' has been amended to 'nervous system disorders' • in B2.16 has been updated to detail that 'chronic obstructive pulmonary disease (COPD) affects oxygen exchange and is classed as a physiological disease' • in B2.17, 'injury and trauma and how the body reacts systemically as a response' has been amended to 'injury and trauma and the various ways in which the body reacts systemically as a response' • in B2.17, 'antibody response' and 'pus		

	formation and exudation' have been added as sub bullets of involuntary inflammatory response • in B2.25, reference to 'Electrocardiographs' has been amended to 'Electrocardiogram' **Amendments made to the Assisting with Healthcare Science occupational specialism section, including:** • in K1.18, additional bullets have been added under 'the importance of assessing physiological measurements against specific normal expected ranges', including: o to be able to assess accurately the health status and body functions of an individual o to be able to provide information on extent of disease or disability o to monitor trends and changes in physiology		