

Pearson BTEC Level 3 National Extended Diploma in Sport and Exercise Science



Specification

First teaching from September 2016

First certification from 2018

Issue 8

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Edexcel, BTEC and LCCI qualifications

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This specification is Issue 8. Key changes are sidelined. We will inform centres of any changes to this issue. The latest issue can be found on our website.

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Welcome

With a track record built over 30 years of learner success, BTEC Nationals are widely recognised by industry and higher education as the signature vocational qualification at Level 3. They provide progression to the workplace either directly or via study at a higher level. Proof comes from YouGov research, which shows that 62% of large companies have recruited employees with BTEC qualifications. What's more, well over 100,000 BTEC students apply to UK universities every year and their BTEC Nationals are accepted by over 150 UK universities and higher education institutes for relevant degree programmes either on their own or in combination with A Levels.

Why are BTECs so successful?

BTECs embody a fundamentally learner-centred approach to the curriculum, with a flexible, unit-based structure and knowledge applied in project-based assessments. They focus on the holistic development of the practical, interpersonal and thinking skills required to be able to succeed in employment and higher education.

When creating the BTEC Nationals in this suite, we worked with many employers, higher education providers, colleges and schools to ensure that their needs are met. Employers are looking for recruits with a thorough grounding in the latest industry requirements and work-ready skills such as teamwork. Higher education needs students who have experience of research, extended writing and meeting deadlines.

We have addressed these requirements with:

- a range of BTEC sizes, each with a clear purpose, so there is something to suit each learner's choice of study programme and progression plans
- refreshed content that is closely aligned with employers' and higher education needs for a skilled future workforce
- assessments and projects chosen to help learners progress to the next stage. This means some are set by you to meet local needs, while others are set and marked by Pearson so that there is a core of skills and understanding that is common to all learners. For example, a written test can be used to check that learners are confident in using technical knowledge to carry out a certain job.

We are providing a wealth of support, both resources and people, to ensure that learners and their teachers have the best possible experience during their course. See *Section 10* for details of the support we offer.

A word to learners

Today's BTEC Nationals are demanding, as you would expect of the most respected applied learning qualification in the UK. You will have to choose and complete a range of units, be organised, take some assessments that we will set and mark, and keep a portfolio of your assignments. But you can feel proud to achieve a BTEC because, whatever your plans in life – whether you decide to study further, go on to work or an apprenticeship, or set up your own business – your BTEC National will be your passport to success in the next stage of your life.

Good luck, and we hope you enjoy your course.

Collaborative development

Students completing their BTEC Nationals in Sport and Exercise Science will be aiming to go on to employment, often via the stepping stone of higher education. It was, therefore, essential that we developed these qualifications in close collaboration with experts from professional bodies, businesses and universities, and with the providers who will be delivering the qualifications. To ensure that the content meets providers' needs and provides high-quality preparation for progression, we engaged experts. We are very grateful to all the university and further education lecturers, teachers, employers, professional body representatives and other individuals who have generously shared their time and expertise to help us develop these new qualifications.

In addition, universities, professional bodies and businesses have provided letters of support confirming that these qualifications meet their entry requirements. These letters can be viewed on our website.

Summary of Pearson BTEC Level 3 National Extended Diploma in Sport and Exercise Science specification Issue 8 changes

Summary of changes made between the previous issue and this current issue	Page number
The wording in Section 7 <i>Teacher/centre malpractice</i> has been updated to clarify suspension of certification in certain circumstances.	Page 197
The wording under Section 9 <i>Understanding the qualification grade</i> has been updated to clarify current practice in ensuring maintenance and consistency of qualification standards.	Page 200

If you need further information on these changes or what they mean, contact us via our website at: qualifications.pearson.com/en/support/contact-us.html.

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Introduction to BTEC National qualifications for the sport and exercise science sector

This specification contains the information you need to deliver the Pearson BTEC Level 3 National Extended Diploma in Sport and Exercise Science. The specification signposts you to additional handbooks and policies. It includes all the units for this qualification.

This qualification is part of the suite of Sport and Exercise Science qualifications offered by Pearson. In the suite there are qualifications that focus on different progression routes, allowing learners to choose the one best suited to their aspirations.

All qualifications in the suite share some common units and assessments, allowing learners some flexibility in moving between sizes. The qualification titles are given below.

Some BTEC National qualifications provide a broad introduction that gives learners transferable knowledge and skills. These qualifications are for post-16 learners who want to continue their education through applied learning. The qualifications prepare learners for a range of higher education courses and job roles related to a particular sector. They provide progression either by meeting entry requirements in their own right or by being accepted alongside other qualifications at the same level and adding value to them.

In the sport and exercise science sector these qualifications are:

Pearson BTEC Level 3 National Extended Certificate in Sport and Exercise Science (603/0444/3)

Pearson BTEC Level 3 National Foundation Diploma in Sport and Exercise Science (603/0443/1)

Pearson BTEC Level 3 National Diploma in Sport and Exercise Science (601/7421/3)

Pearson BTEC Level 3 National Extended Diploma in Sport and Exercise Science (601/7422/5).

This specification signposts all the other essential documents and support that you need as a centre in order to deliver, assess and administer the qualification, including the staff development required. A summary of all essential documents is given in *Section 7*. Information on how we can support you with this qualification is given in *Section 10*.

The information in this specification is correct at the time of publication.

Total Qualification Time

For all regulated qualifications, Pearson specifies a total number of hours that it is estimated learners will require to complete and show achievement for the qualification: this is the Total Qualification Time (TQT). Within TQT, Pearson identifies the number of Guided Learning Hours (GLH) that we estimate a centre delivering the qualification might provide. Guided learning means activities, such as lessons, tutorials, online instruction, supervised study and giving feedback on performance, that directly involve teachers and assessors in teaching, supervising and invigilating learners. Guided learning includes the time required for learners to complete external assessment under examination or supervised conditions.

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

BTEC Nationals have been designed around the number of hours of guided learning expected. Each unit in the qualification has a GLH value of 60, 90 or 120. There is then a total GLH value for the qualification.

Each qualification has a TQT value. This may vary within sectors and across the suite depending on the nature of the units in each qualification and the expected time for other required learning.

The following table shows all the qualifications in this sector and their GLH and TQT values.

Qualifications, sizes and purposes at a glance

Title	Size and structure	Summary purpose
Pearson BTEC Level 3 National Extended Certificate in Sport and Exercise Science	360 GLH (480 TQT) Equivalent in size to one A Level. 4 units of which 3 are mandatory and 2 are external. Mandatory content (83%). External assessment (58%).	A broad basis of study for the sport and exercise science sector. Designed to support progression to higher education when taken as part of a programme of study that includes other appropriate BTEC Nationals or A Levels.
Pearson BTEC Level 3 National Foundation Diploma in Sport and Exercise Science	510 GLH (680 TQT) Equivalent in size to 1.5 A Levels. 6 units of which 4 are mandatory and 2 are external. Mandatory content (76%). External assessment (41%).	Designed as a one-year, full-time course covering the fundamentals in the sport and exercise science sector, supporting progression to an apprenticeship in the sports sector or to a further year of study at Level 3. It supports progression to higher education when taken as part of a programme of study that includes other BTEC Nationals or A Levels.
Pearson BTEC Level 3 National Diploma in Sport and Exercise Science	720 GLH (960 TQT) Equivalent in size to two A Levels. 8 units of which 6 are mandatory and 3 are external. Mandatory content (83%). External assessment (46%).	Taken alongside a further qualification related to their chosen field, e.g. A Level Biology, Mathematics or Psychology, or a BTEC Certificate in Business, this qualification is for learners who are intending to study towards a degree in the sport and exercise sector.
Pearson BTEC Level 3 National Extended Diploma in Sport and Exercise Science	1080 GLH (1420 TQT) Equivalent in size to three A Levels. 13 units of which 7 are mandatory and 4 are external. Mandatory content (67%). External assessment (42%).	This is the largest qualification in the suite of BTEC Nationals in Sport and Exercise Science and is equivalent in size to three A Levels. It is best suited to learners who want to progress to higher education programmes in the sport and exercise science sector.

Structures of the qualifications at a glance

This table shows all the units and the qualifications to which they contribute. The full structure for this Pearson BTEC Level 3 National in Sport and Exercise Science is shown in *Section 2*. **You must refer to the full structure to select units and plan your programme.**

Key

Unit assessed externally	M	Mandatory units	O	Optional units
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Unit (number and title)	Unit size (GLH)	Extended Certificate (360 GLH)	Foundation Diploma (510 GLH)	Diploma (720 GLH)	Extended Diploma (1080 GLH)
1 Sport and Exercise Physiology	120			M	M
2 Functional Anatomy	90	M	M	M	M
3 Applied Sport and Exercise Psychology	120	M	M	M	M
4 Field and Laboratory-based Fitness Testing	90			M	M
5 Applied Research Methods in Sport and Exercise Science	90		M	M	M
6 Coaching for Performance and Fitness	90	M	M	M	M
7 Biomechanics in Sport and Exercise Science	60	O	O	O	O
8 Specialised Fitness Training	60	O	O	O	O
9 Research Project in Sport and Exercise Science	60		O	O	O
10 Physical Activity for Individual and Group-based Exercise	60	O	O	O	O
11 Sports Massage	60		O	O	O
12 Sociocultural Issues in Sport and Exercise	60		O	O	O
13 Nutrition for Sport and Exercise Performance	120				M
14 Technology in Sport and Exercise Science	60				O
15 Sports Injury and Assessment	60				O

Qualification and unit content

Pearson has developed the content of the new BTEC Nationals in collaboration with employers and representatives from higher education and relevant professional bodies. In this way, we have ensured that content is up to date and that it includes the knowledge, understanding, skills and attributes required in the sector.

Each qualification in the suite has its own purpose. The mandatory and optional content provides a balance of breadth and depth, while retaining a degree of choice for individual learners to study content relevant to their own interests and progression choices. Also, the content may be applied during delivery in a way that is relevant to local employment needs.

The proportion of mandatory content ensures that all learners are following a coherent programme of study and acquiring the knowledge, understanding and skills that will be recognised and valued. Learners are expected to show achievement across mandatory units as detailed in *Section 2*.

BTEC Nationals have always required applied learning that brings together knowledge and understanding (the cognitive domain) with practical and technical skills (the psychomotor domain). This is achieved through learners performing vocational tasks that encourage the development of appropriate vocational behaviours (the affective domain) and transferable skills. Transferable skills are those such as communication, teamwork, research and analysis, which are valued in both higher education and the workplace.

Our approach provides rigour and balance, and promotes the ability to apply learning immediately in new contexts. Further details can be found in *Section 2*.

Centres should ensure that delivery of content is kept up to date. In particular units may include reference to regulation, legislation, policies and regulatory/standards organisations. This is designed to provide guidance on breadth and depth of coverage and may be adjusted to update content and to reflect variations within the UK.

Assessment

Assessment is specifically designed to fit the purpose and objective of the qualification. It includes a range of assessment types and styles suited to vocational qualifications in the sector. There are three main forms of assessment that you need to be aware of: external, internal and synoptic.

Externally-assessed units

Each external assessment for a BTEC National is linked to a specific unit. All of the units developed for external assessment are of 90 or 120 GLH to allow learners to demonstrate breadth and depth of achievement. Each assessment is taken under specified conditions, then marked by Pearson and a grade awarded. Learners are permitted to resit external assessments during their programme. You should refer to our website for current policy information on permitted retakes.

The styles of external assessment used for qualifications in the Sport and Exercise Science suite are:

- examinations – all learners take the same assessment at the same time, normally with a written outcome
- set tasks – learners take the assessment during a defined window and demonstrate understanding through completion of a vocational task.

Some external assessments include a period of preparation using set information. External assessments are available once or twice a year. For detailed information on the external assessments please see the table in *Section 2*. For further information on preparing for external assessment see *Section 5*.

Internally-assessed units

Most units in the sector are internally assessed and subject to external standards verification. This means that you set and assess the assignments that provide the final summative assessment of each unit, using the examples and support that Pearson provides. Before you assess you will need to become an approved centre, if you are not one already. You will need to prepare to assess using the guidance in *Section 6*.

In line with the requirements and guidance for internal assessment, you select the most appropriate assessment styles according to the learning set out in the unit. This ensures that learners are assessed using a variety of styles to help them develop a broad range of transferable skills. Learners could be given opportunities to:

- write up the findings of their own research
- use case studies to explore complex or unfamiliar situations
- carry out projects for which they have choice over the direction and outcomes
- demonstrate practical and technical skill.

You will make grading decisions based on the requirements and supporting guidance given in the units. Learners may not make repeated submissions of assignment evidence. For further information see *Section 6*.

Synoptic assessment

Synoptic assessment requires learners to demonstrate that they can identify and use effectively, in an integrated way, an appropriate selection of skills, techniques, concepts, theories and knowledge from across the whole sector as relevant to a key task. BTEC learning has always encouraged learners to apply their learning in realistic contexts using scenarios and realistic activities that will permit learners to draw on and apply their learning. For these qualifications we have formally identified units which contain a synoptic assessment task. Synoptic assessment must take place after the teaching and learning of other mandatory units in order for learners to be able to draw from the full range of content. The synoptic assessment gives learners an opportunity to independently select and apply learning from across their programmes in the completion of a vocational task. Synoptic tasks may be in internally or externally assessed units. The particular unit that contains the synoptic tasks for this qualification is shown in the structure in *Section 2*.

Language of assessment

Assessment of the internal and external units for these qualifications will be available in English. All learner work must be in English. A learner taking the qualifications may be assessed in British or Irish Sign Language where it is permitted for the purpose of reasonable adjustment. For information on reasonable adjustments see *Section 7*.

Grading for units and qualifications

Achievement in the qualification requires a demonstration of depth of study in each unit, assured acquisition of a range of practical skills required for employment or progression to higher education, and successful development of transferable skills. Learners achieving a qualification will have achieved across mandatory units, including external and synoptic assessment.

Units are assessed using a grading scale of Distinction (D), Merit (M), Pass (P), Near Pass (N) and Unclassified (U). The grade of Near Pass is used for externally-assessed units only. All mandatory and optional units contribute proportionately to the overall qualification grade, for example a unit of 120 GLH will contribute double that of a 60 GLH unit.

Qualifications in the suite are graded using a scale of P to D*, **or** PP to D*D*, **or** PPP to D*D*D*. Please see *Section 9* for more details. The relationship between qualification grading scales and unit grades will be subject to regular review as part of Pearson's standards monitoring processes on the basis of learner performance and in consultation with key users of the qualification.

UCAS Tariff points

The BTEC Nationals attract UCAS points. Please go to the UCAS website for full details of the points allocated.

1 Qualification purpose

Pearson BTEC Level 3 National Extended Diploma in Sport and Exercise Science

In this section you will find information on the purpose of this qualification and how its design meets that purpose through the qualification objective and structure. We publish a full 'Statement of Purpose' for each qualification on our website. These statements are designed to guide you and potential learners to make the most appropriate choice about the size of qualification suitable at recruitment.

Who is this qualification for?

The Pearson BTEC National Extended Diploma in Sport and Exercise Science is intended to be an Applied General qualification. It is for post-16 learners who want to continue their education through applied learning, and who aim to progress to higher education and ultimately to employment, possibly in the sport and exercise science sector. The qualification is wide-ranging and equivalent in size to three A Levels, and has been designed as a full two-year study programme.

Learners who wish to take this qualification will have successfully completed a Level 2 programme of study with GCSEs and potentially some vocational qualifications.

What does this qualification cover?

The content of this qualification has been developed in consultation with academics to ensure that it supports progression to higher education. Employers and professional bodies have also been involved and consulted to confirm that the content is appropriate and consistent with current practice for learners choosing to enter employment in the sport and exercise science sector.

The qualification gives learners the knowledge, understanding and skills that underpin study of the sport and exercise science sector, and gives learners additional breadth and depth to prepare them fully for further study or training. This includes the opportunity for learners to choose several topics from a selection of options reflecting progression in sport and exercise science.

Learners will study seven mandatory content areas:

- Applied Research Methods in Sport and Exercise Science
- Applied Sport and Exercise Psychology
- Coaching for Performance and Fitness
- Field and Laboratory-based Fitness Testing
- Functional Anatomy
- Nutrition for Sport and Exercise Performance
- Sport and Exercise Physiology.

As the mandatory content is equivalent in size to two A Levels, higher education representatives have confirmed that it is appropriate to allow learners to choose from a wide range of optional units in the final third of the qualification, so that they can explore their own choice of areas for further study. The optional units have been designed to support progression to sport and exercise science courses in higher education.

The optional content areas include:

- Biomechanics in Sport and Exercise Science
- Research Project in Sport and Exercise Science
- Physical Activity for Individual and Group-based Exercise
- Sociocultural Issues in Sport and Exercise
- Specialised Fitness Training
- Sports Injury and Assessment
- Sports Massage
- Technology in Sport and Exercise Science.

What could this qualification lead to?

This qualification is primarily designed to support progression to employment after further study at university. However, it also supports learners who may choose to progress directly to employment, as the transferable knowledge, understanding and skills will give learners an advantage in applying for entry level roles or 'school leaver' industry training programmes and Higher Apprenticeships in areas such as sport and fitness training, coaching, and sports performance research.

In addition to the sector-specific content, the requirements of the qualification will mean that learners develop the transferable and higher order skills which are valued by higher education providers and employers. For example, the study of applied research methods and the research project require learners to carry out individual research and to give evidence in a sport science context, evaluating and justifying their findings.

The qualification is intended to carry UCAS points and is recognised by higher education providers as meeting admission requirements for many relevant courses, for example:

- BSc (Hons) in Sport and Exercise Science
- BSc (Hons) in Sport Science
- BSc (Hons) in Sport and Coaching Studies.

Learners should always check the entry requirements for degree programmes with specific higher education providers.

How does the qualification provide employability skills?

In the BTEC National units there are opportunities during the teaching and learning phase to give learners practice in developing employability skills. Where employability skills are referred to in this specification, we are generally referring to skills in the following three main categories:

- **cognitive and problem-solving skills:** use critical thinking, approach non-routine problems applying expert and creative solutions, use systems and technology
- **intrapersonal skills:** communicating, working collaboratively, negotiating and influencing, self-presentation
- **interpersonal skills:** self-management, adaptability and resilience, self-monitoring and development.

There are also specific requirements in some units for assessment of these skills where relevant, for example, where learners are required to undertake real or simulated activities.

How does the qualification provide transferable knowledge and skills for higher education?

All BTEC Nationals provide transferable knowledge and skills that prepare learners for progression to university. The transferable skills that universities value include:

- the ability to learn independently
- the ability to research actively and methodically
- being able to give presentations and being active group members.

BTEC learners can also benefit from opportunities for deep learning where they are able to make connections among units and select areas of interest for detailed study. BTEC Nationals provide a vocational context in which learners can develop the knowledge and skills required for particular degree courses, including:

- reading technical texts
- effective writing
- analytical skills
- creative development
- preparation for assessment methods used in degrees.

2 Structure

Qualification structure

Pearson BTEC Level 3 National Extended Diploma in Sport and Exercise Science

Mandatory units

There are seven mandatory units, three internal and four external. Learners must complete and achieve a Near Pass grade or above in all mandatory external units and achieve a Pass or above in all mandatory internal units.

Optional units

Learners must complete six optional units.

Pearson BTEC Level 3 National Extended Diploma in Sport and Exercise Science				
Unit number	Unit title	GLH	Type	How assessed
Mandatory units – learners complete and achieve all units				
1	Sport and Exercise Physiology	120	Mandatory and Synoptic	External
2	Functional Anatomy	90	Mandatory	External
3	Applied Sport and Exercise Psychology	120	Mandatory	External
4	Field and Laboratory-based Fitness Testing	90	Mandatory	Internal
5	Applied Research Methods in Sport and Exercise Science	90	Mandatory	Internal
6	Coaching for Performance and Fitness	90	Mandatory	Internal
13	Nutrition for Sport and Exercise Performance	120	Mandatory	External
Optional units – learners complete 6 units				
7	Biomechanics in Sport and Exercise Science	60	Optional	Internal
8	Specialised Fitness Training	60	Optional	Internal
9	Research Project in Sport and Exercise Science	60	Optional	Internal
10	Physical Activity for Individual and Group-based Exercise	60	Optional	Internal
11	Sports Massage	60	Optional	Internal
12	Sociocultural Issues in Sport and Exercise	60	Optional	Internal
14	Technology in Sport and Exercise Science	60	Optional	Internal
15	Sports Injury and Assessment	60	Optional	Internal

External assessment

This is a summary of the type and availability of external assessment, which is of units making up 42% of the total qualification GLH. See *Section 5* and the units and sample assessment materials for more information.

For assessment from 2019 onwards refer to SAMS Issue 3 and unit content in this issue which replaces the 2017 versions.

Unit	Type	Availability
Unit 1: Sport and Exercise Physiology	<ul style="list-style-type: none"> • Written examination set and marked by Pearson. • 1.5 hours. • 70 marks. 	Jan and May/June First assessment May/June
Unit 2: Functional Anatomy	<ul style="list-style-type: none"> • Written examination set and marked by Pearson. • 1.5 hours. • 60 marks. 	Jan and May/June First assessment May/June
Unit 3: Applied Sport and Exercise Psychology	<ul style="list-style-type: none"> • A task set and marked by Pearson and completed in a single session of three hours under supervised conditions. • Written submission. • 60 marks. 	Dec/Jan and May/June For assessment from January 2019 onwards
Unit 13: Nutrition for Sport and Exercise Performance	<ul style="list-style-type: none"> • A task set and marked by Pearson and completed in a single session of 3 hours under supervised conditions. • Written submission. • 50 marks. 	Dec/Jan and May/June For assessment from January 2019 onwards

Synoptic assessment

The mandatory synoptic assessment requires learners to apply learning from across the qualification to the completion of a defined vocational task. Within the assessment for *Unit 1: Sport and Exercise Physiology*, learners interpret physiology factors and exercise and fitness data to show an understanding of the physiology that contributes to the performance of an individual, the physiology aspects of coaching for performance and fitness, and the role physiology has in fitness training, testing and sports injuries. Learners complete the task using knowledge and understanding from their studies of the sector and apply both transferable and specialist knowledge and skills.

In delivering the unit you need to encourage learners to draw on their broader learning so they will be prepared for the assessment.

Employer involvement in assessment and delivery

You are encouraged to give learners opportunities to be involved with employers.

See *Section 4* for more information.

3 Units

Understanding your units

The units in this specification set out our expectations of assessment in a way that helps you to prepare your learners for assessment. The units help you to undertake assessment and quality assurance effectively.

Each unit in the specification is set out in a similar way. There are two types of unit format:

- internal units
- external units.

This section explains how the units work. It is important that all teachers, assessors, internal verifiers and other staff responsible for the programme review this section.

Internal units

Section	Explanation
Unit number	The number is in a sequence in the sector. Numbers may not be sequential for an individual qualification.
Unit title	This is the formal title that we always use and it appears on certificates.
Level	All units are at Level 3 on the national framework.
Unit type	This shows if the unit is internal or external only. See structure information in <i>Section 2</i> for full details.
GLH	Units may have a GLH value of 120, 90 or 60 GLH. This indicates the numbers of hours of teaching, directed activity and assessment expected. It also shows the weighting of the unit in the final qualification grade.
Unit in brief	A brief formal statement on the content of the unit that is helpful in understanding its role in the qualification. You can use this in summary documents, brochures etc.
Unit introduction	This is designed with learners in mind. It indicates why the unit is important, how learning is structured, and how learning might be applied when progressing to employment or higher education.
Learning aims	These help to define the scope, style and depth of learning of the unit. You can see where learners should be learning standard requirements ('understand') or where they should be actively researching ('investigate'). You can find out more about the verbs we use in learning aims in <i>Appendix 2</i> .
Summary of unit	This new section helps teachers to see at a glance the main content areas against the learning aims and the structure of the assessment. The content areas and structure of assessment are required. The forms of evidence given are suitable to fulfil the requirements.
Content	This section sets out the required teaching content of the unit. Content is compulsory except when shown as 'e.g.'. Learners should be asked to complete summative assessment only after the teaching content for the unit or learning aim(s) has been covered.

Section	Explanation
Assessment criteria	<p>Each learning aim has Pass and Merit criteria. Each assignment has at least one Distinction criterion.</p> <p>A full glossary of terms used is given in <i>Appendix 2</i>. All assessors need to understand our expectations of the terms used.</p> <p>Distinction criteria represent outstanding performance in the unit. Some criteria require learners to draw together learning from across the learning aims.</p>
Essential information for assignments	<p>This shows the maximum number of assignments that may be used for the unit to allow for effective summative assessment, and how the assessment criteria should be used to assess performance.</p>
Further information for teachers and assessors	<p>The section gives you information to support the implementation of assessment. It is important that this is used carefully alongside the assessment criteria.</p>
Resource requirements	<p>Any specific resources that you need to be able to teach and assess are listed in this section. For information on support resources see <i>Section 10</i>.</p>
Essential information for assessment decisions	<p>This information gives guidance for each learning aim or assignment of the expectations for Pass, Merit and Distinction standard. This section contains examples and essential clarification.</p>
Links to other units	<p>This section shows you the main relationship among units. This section can help you to structure your programme and make best use of materials and resources.</p>
Employer involvement	<p>This section gives you information on the units that can be used to give learners involvement with employers. It will help you to identify the kind of involvement that is likely to be successful.</p>

External units

Section	Explanation
Unit number	The number is in a sequence in the sector. Numbers may not be sequential for an individual qualification.
Unit title	This is the formal title that we always use and it appears on certificates.
Level	All units are at Level 3 on the national framework.
Unit type	This shows if the unit is internal or external only. See structure information in <i>Section 2</i> for full details.
GLH	Units may have a GLH value of 120, 90 or 60 GLH. This indicates the numbers of hours of teaching, directed activity and assessment expected. It also shows the weighting of the unit in the final qualification grade.
Unit in brief	A brief formal statement on the content of the unit.
Unit introduction	This is designed with learners in mind. It indicates why the unit is important, how learning is structured, and how learning might be applied when progressing to employment or higher education.
Summary of assessment	This sets out the type of external assessment used and the way in which it is used to assess achievement.
Assessment outcomes	These show the hierarchy of knowledge, understanding, skills and behaviours that are assessed. Includes information on how this hierarchy relates to command terms in sample assessment materials (SAMs).
Essential content	For external units all the content is obligatory, the depth of content is indicated in the assessment outcomes and sample assessment materials (SAMs). The content will be sampled through the external assessment over time, using the variety of questions or tasks shown.
Grade descriptors	We use grading descriptors when making judgements on grade boundaries. You can use them to understand what we expect to see from learners at particular grades.
Key terms typically used in assessment	These definitions will help you analyse requirements and prepare learners for assessment.
Resources	Any specific resources that you need to be able to teach and assess are listed in this section. For information on support resources see <i>Section 10</i> .
Links to other units	This section shows the main relationship among units. This section can help you to structure your programme and make best use of materials and resources.
Employer involvement	This section gives you information on the units that can be used to give learners involvement with employers. It will help you to identify the kind of involvement that is likely to be successful.

Index of units

This section contains all the units developed for this qualification. Please refer to *page 4* to check which units are available in all qualifications in the sports and exercise science sector.

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Unit 1: Sport and Exercise Physiology

Level: **3**

Unit type: **External**

Guided learning hours: **120**

Unit in brief

Learners explore the different body systems and their response to sport and exercise in normal conditions, as well as in different environments.

Unit introduction

Understanding the skeletal, muscular, cardiovascular, respiratory, neural and energy systems is essential in the sport and exercise science sector. You will learn how these systems work together to enable participants to take part in a huge variety of sport and exercise activities in normal conditions, in hot conditions and at altitude. This knowledge will enable sport and exercise professionals to help improve athlete performance for specific events and also when performing in different environmental conditions.

To understand how each of these body systems function, you will explore how each system functions on its own and also in combination with the other body systems. The responses of each system will depend on the stage of the physical activity and the exercise history of the individual. Exercise cannot continue indefinitely so this unit will also cover the effects of fatigue and ways to improve recovery rate. You will also explore the effects of different environmental conditions on the body's systems and on athletic performance. You will gain a full appreciation of how a person can take part in a range of different sport and exercise activities through understanding the interrelationships between each of the body's systems. To complete the assessment task within this unit, you will need to draw on your learning from across your programme.

This unit will provide you with the detailed core knowledge required to progress to employment in the sport and exercise science industry or further study.

Summary of assessment

This unit is assessed by a written examination set and marked by Pearson. The examination will be one hour and 30 minutes in length.

The number of marks for the examination is 70. The paper will contain a number of short- and long-answer questions that will assess learners' understanding of exercise physiology in normal conditions and in different environmental conditions.

The assessment availability is twice a year in January and May/June.

The first assessment availability is May/June 2017.

Sample assessment materials will be available to help centres prepare learners for assessment.

Assessment outcomes

AO1 Demonstrate knowledge and understanding of body systems and how they respond and adapt to exercise in different environments

Command words: describe, explain, give, identify, name, state

Marks: range from 1 to 4 marks

AO2 Apply knowledge and understanding of body systems and how they respond and adapt to exercise in different environments in context

Command words: describe, explain

Marks: range from 1 to 4 marks

AO3 Analyse sports performance data to interpret the body's responses and adaptations to exercise and evaluate their impact on sport and exercise performance

Command words: analyse, assess, discuss, evaluate

Marks: 8 marks

AO4 Make connections between how the body systems work together in response to the demands of sport and exercise and to enhance performance

Command words: analyse, assess, discuss, evaluate, to what extent

Marks: 8 marks

Essential content

The essential content is set out under content areas. Learners must cover all specified content before the assessment.

A Responses of the body systems to a single sport or exercise session

Understand each body system in response to a single sport or exercise session for a range of activities and the interrelationships between the body systems.

A1 Skeletal system

- Osteoclast activity (in response to weight-bearing exercise).
- Synovial fluid (increase in amount and reduction in viscosity).

A2 Muscular system

- Muscle fibre recruitment (Type I, Type IIa, Type IIx).
- Blood flow to working muscles.
- Micro-tears.
- Temperature.

A3 Respiratory system

- Control of breathing rate (chemical and neural control).
- Respiratory muscles.
- Additional skeletal muscles that aid breathing.
- Tidal volume.
- Minute volume (VE).
- Calculation of VE.
- Oxygen dissociation curve.

A4 Cardiovascular system

- Anticipatory increase in heart rate.
- Cardiac output (Q), heart rate (HR) and stroke volume (SV).
- Starling's Law.
- Calculation of Q ($Q = SV \times HR$).
- Blood pressure (response to aerobic and strength training).
- Cardiac cycle.
- Redistribution of blood flow (vasoconstriction and vasodilation).
- Changes in blood pH (increased acidity due to carbon dioxide in the blood stream).
- Diffusion rate.
- Arteriovenous oxygen difference (a-vO₂ diff).

A5 Nervous system

- Motor unit (increased recruitment in response to increased intensity).
- Muscle spindles.
- Golgi tendon organs (GTOs).
- Chemoreceptors.
- Thermoreceptors.
- Baroreceptors.

A6 Endocrine system

Learners must understand the effects of hormones on body systems.

- Adrenaline.
- Noradrenaline.
- Cortisol.
- Testosterone and its effect on the muscular system.
- Human growth hormone (HGH).
- Oestrogen and its effect on the skeletal system.

A7 Energy systems

Understand anaerobic and aerobic energy production for sport and exercise.

- Energy sources (stored adenosine triphosphate (ATP), phosphocreatine, blood glucose, glycogen, fatty acids).
- ATP-PC system.
- Lactate system (anaerobic glycolysis).
- Aerobic system (aerobic glycolysis, Krebs cycle, electron transport chain, role of mitochondria).
- ATP yield for each system.
- Energy system continuum.
- Onset of blood lactate accumulation (OBLA).
- Recovery time for each system.

B Fatigue and how the body recovers from exercise

Understand the causes, effects and recovery from fatigue for each body system.

B1 Causes of fatigue

- Depletion of energy sources (ATP, phosphagen, glucose, glycogen).
- Accumulation of waste products (carbon dioxide, lactate).
- Depletion of acetylcholine.

B2 Recovery of energy systems

- Excess post-exercise oxygen consumption (EPOC).
- Replacement of muscle ATP and phosphagen.
- Replacement of glycogen stores.
- Resaturation of myoglobin.
- Appropriate nutritional strategy (protein intake relative to body weight and exercise type, carbohydrate intake related to activity levels, rehydration).
- Use of dietary supplements (protein shakes, carbohydrate drinks/gels).

B3 Recovery of musculoskeletal system

- Replacement of collagen in tendons and ligaments.
- Replacement of calcium in bones.
- Repair to micro-tears in muscles.
- Delayed onset of muscle soreness (DOMS).

B4 Overtraining

- Causes (exercise addiction, imbalanced training programme).
- Physiological effects (imbalances in the endocrine system, excess adrenaline and cortisol production, insufficient rest periods to repair muscular and skeletal tissues).
- Impact on performance and body systems (decrement in performance level, decreased immune function, increased susceptibility to injury, overuse injury).
- Inadequate amounts of sleep and rest.

C Adaptations of the body systems to exercise

Understand how adaptation to training and interrelationship of body systems improve sport and exercise performance.

C1 Skeletal system

- Osteoblast, osteoclast and osteocyte activity.
- Bone remodelling.
- Mineral content.
- Collagen content.

C2 Muscular system

- Hypertrophy.
- Muscular strength.
- Muscular endurance.
- Muscle tone.
- Hyperplasia.
- Mitochondria.
- Myoglobin.
- Glycogen and triglyceride stores.
- Adaptation of muscle fibre types.
- Capillarisation.

C3 Respiratory system

- Respiratory muscles.
- Lung volumes (tidal volume, vital capacity, minute volume, residual volume).
- Respiratory rate.

C4 Cardiovascular system

- Cardiac hypertrophy.
- Sinoatrial node.
- Cardiac cycle.
- Cardiac output (heart rate, stroke volume).
- Blood pressure.
- Blood composition.
- Diffusion rate.

C5 Nervous system

- Motor units.
- Neural pathway transmission efficiency.
- Nervous inhibition.

C6 Endocrine system

- Adrenaline (increase in capacity to secrete adrenaline), noradrenaline (increased capacity to secrete noradrenaline), cortisol (lowered cortisol response to endurance exercise, increased resting levels in response to strength training).
- Testosterone (higher resting levels in response to strength training) and human growth hormone (HGH) (increases in resting levels of HGH in response to strength training).

C7 Energy systems

- Stores of ATP, phosphocreatine (PC), glycogen, triglyceride.
- Number and size of mitochondria.
- OBLA.
- Aerobic and anaerobic enzymes.
- Lactate buffering.
- Respiratory exchange ratio (RER).

C8 Measurement of body systems and their contribution to sport and exercise performance

- VO_2 max.
- Anaerobic threshold (% of VO_2 max).
- Anaerobic power.
- Strength (1RM).
- Muscular endurance (15RM).

D Environmental factors and sport and exercise performance

Understand the responses and adaptations of the body systems to differing environmental factors during sport and exercise performance.

D1 High altitude

- High altitude: 2400 m.
- Partial pressure of oxygen at altitude compared with sea level.

D2 Responses of body systems to high altitude

Initial responses of body to high altitude:

- hypoxia
- increased breathing rate (possible hyperventilation)
- increased heart rate (possible tachycardia)
- reduced VO_2 max
- possible symptoms of altitude sickness.

D3 Adaptations of the body systems to high altitude

- Adaptations to high altitude:
 - red blood cell production
 - haemoglobin concentration
 - capillarisation
 - mitochondria
 - oxidative enzymes.
- Impact of adaptations on sport and exercise performance:
 - aerobic performance
 - anaerobic performance.
- Promoting equivalent adaptations to high altitude to enhance sport and exercise performance at sea level:
 - hypoxic chambers to sleep and/or train
 - sleep high, train low.

D4 Thermoregulation

Homeostasis:

- convection
- conduction
- radiation
- evaporation.

D5 Excessive heat

- Methods of heat loss from the body.
- Responses of the body to excessive heat during sport and exercise performance:
 - hyperthermia
 - dehydration.
- Adaptions to excessive heat on the body during sport and exercise performance:
 - increased sweat production
 - reduced electrolyte concentration in sweat
 - increased blood plasma volume
 - earlier onset of sweating.
- Impact of adaptations on sport and exercise performance:
 - aerobic performance
 - anaerobic performance.

D6 Extreme cold

- Methods of reducing heat loss during sport and exercise performance:
 - vasoconstriction
 - shivering
 - shivering thermogenesis
 - non-shivering thermogenesis.
- Effects of extreme cold on the body during sport and exercise performance:
 - hypothermia
 - frostbite.

Grade descriptors

To achieve a grade a learner is expected to demonstrate these attributes across the essential content of the unit. The principle of best fit will apply in awarding grades.

Level 3 Pass

Learners are able to demonstrate knowledge of sport and exercise physiology and apply it to sport and exercise performance. They have a sound understanding of how the body's systems respond to exercise in the short term and adapt to regular strength and conditioning training programmes in the long term. They have an understanding of how the body's systems work together during exercise and the impact different environmental conditions and fatigue have on the body's systems.

Level 3 Distinction

Learners are able to demonstrate thorough knowledge and comprehensive understanding of sport and exercise physiology and apply it to performance in a range of exercise and sports contexts. They can analyse how the body's systems respond to exercise in the short term and adapt to regular strength and conditioning training programmes in the long term. They are able to make connections between the body's systems and assess how they work together during exercise to supply and utilise energy. They can analyse the impact that different environmental conditions and fatigue have on the body's systems and the performance of athletes.

Key terms typically used in assessment

The following table shows the key terms that will be used consistently by Pearson in our assessments to ensure students are rewarded for demonstrating the necessary skills.

Please note: the list below will not necessarily be used in every paper/session and is provided for guidance only.

Command or term	Definition
Analyse	Learners examine in detail, in order to discover the meaning or essential features of a theme, topic or situation, or break something down into its components or examining factors methodically and in detail. To identify separate factors, say how they are related and explain how each one contributes to the topic.
Assess	Learners present a careful consideration of varied factors or events that apply to a specific situation or identifies those which are the most important or relevant to arrive at a conclusion.
Describe	Learners give an account, or details, of 'something' or give an account of a 'process'.
Discuss	Learners identify the issue/situation/problem/argument that is being assessed in the question given, exploring all aspects and investigating fully.
Evaluate	Learners review information before bringing it together to form a conclusion or come to a supported judgement of a subject's qualities in relation to its context, drawing on evidence: strengths, weaknesses, alternative actions, relevant data or information.

Command or term	Definition
Explain	Learners convey understanding by making a point/statement or by linking the point/statement with a justification/expansion.
Give	Learners can provide examples, justifications and/or reasons to a context.
Identify	Learners assess factual information that may require a single word answer, although sometimes a few words or a maximum of a single sentence are required.
State/name	Learners give a definition or example.
To what extent	Learners review information then bring it together to form a judgement or conclusion, following the provision of a balanced and reasoned argument.

Links to other units

The assessment for this unit should draw on knowledge, understanding, and skills developed from:

- Unit 2 Functional Anatomy
- Unit 3 Applied Sport and Exercise Psychology
- Unit 4 Field and Laboratory-based Fitness Testing
- Unit 5 Applied Research Methods in Sport and Exercise Science
- Unit 6 Coaching for Performance and Fitness
- Unit 13 Nutrition for Sport and Exercise Performance

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit.

Unit 2: Functional Anatomy

Level: **3**

Unit type: **External**

Guided learning hours: **90**

Unit in brief

Learners explore how the anatomy of the cardiovascular, respiratory, skeletal and muscular systems function to produce movements in sport and exercise.

Unit introduction

The human body is made up of different systems that work together to enable us to take part in sport and exercise. The respiratory system enables our bodies to extract oxygen from the air around us and to dispose of waste products, such as carbon dioxide, that would otherwise poison us if allowed to build up. The cardiovascular system plays a key role in delivering oxygen to working muscles. When the oxygen is used, it gives us the energy to enable the musculoskeletal system to bring about the movement that allows us to take part in sport and exercise. In order to appreciate how each of these systems function, you will explore how the anatomical structure and physiology of each system contributes to the production of movement of the human body in sport and exercise. In addition, you will analyse the effectiveness of each anatomical system in producing sport and exercise movements, and explore what impact each system has on performing movements successfully.

This unit will develop your knowledge and understanding of how the human body produces movement as well as the factors that can contribute to making the performance of movement more effective. It will prepare you for progression to higher education or a career in sport science, coaching, or the fitness industry.

Summary of assessment

This unit is assessed by a written examination set and marked by Pearson. The examination will be one hour and 30 minutes in length.

The number of marks for the assessment is 60. The paper will contain a number of short- and long-answer questions that will assess learners' understanding of the anatomy of the cardiovascular, respiratory, skeletal, and muscular systems. Learners will use their knowledge and understanding of the different systems to analyse how they produce movements in sport and exercise, including how they interrelate to carry out those movements.

The assessment availability is twice a year in January and May/June.

The first assessment availability is May/June 2017.

Sample assessment materials will be available to help centres prepare learners for assessment.

Assessment outcomes

AO1 Demonstrate knowledge and understanding of the language, structure, characteristics and function of each anatomical system

Command words: describe, give, identify, name, state

Marks: range from 1 to 4 marks

AO2 Apply knowledge and understanding of the structure, characteristics and function of the anatomical systems in context

Command words: describe, explain

Marks: range from 2 to 4 marks

AO3 Analyse the anatomical systems' effectiveness in producing sport and exercise movements and evaluate their impact on performing movements successfully

Command words: analyse, assess, evaluate, discuss, to what extent

Marks: range from 8 to 14 marks

AO4 Make connections between anatomical systems and how they interrelate in order to carry out different exercise and sporting movements in context

Command words: analyse, assess, evaluate, discuss, to what extent

Marks: range from 8 to 14 marks

Essential content

The essential content is set out under content areas. Learners must cover all specified content before the assessment.

A Anatomical positions, terms and references

A1 Anatomical language

Learners must understand anatomical language to describe different parts of the body in reference to their correct location.

- Anatomical standing position (point of reference).
- Anatomical language:
 - anterior
 - posterior
 - lateral
 - medial
 - proximal
 - distal
 - superior
 - inferior
 - peripheral
 - deep
 - supine
 - prone.

B Anatomy of the cardiovascular system

B1 Location, anatomy and function of cardiovascular components

- Function and anatomy of the heart:
 - atria
 - ventricles
 - bicuspid valve
 - tricuspid valve
 - semilunar valves
 - chordae tendineae
 - septum
 - coronary arteries.
- Location and anatomy of blood vessels:
 - aorta
 - vena cava
 - pulmonary artery
 - pulmonary vein
 - arteries
 - arterioles
 - veins
 - venuoles
 - capillaries.
- Composition of blood:
 - red blood cells (erythrocytes)
 - plasma
 - white blood cells
 - platelets.
- Lymphatic system.

B2 Function of the cardiovascular system

Learners must understand the function of the cardiovascular system.

- Delivery of oxygen and nutrients.
- Removal of waste products – carbon dioxide and lactate.
- Control of blood flow – vasoconstriction, vasodilation of blood vessels.
- Fight infection.
- Clot blood.

B3 Cardiac cycle

- Blood flow through the heart:
 - systole
 - diastole.
- Neural control of the cardiac cycle:
 - sinoatrial node (SAN)
 - atrioventricular node (AVN)
 - bundle of His
 - Purkinje fibres.

C Anatomy of the respiratory system

C1 Location, anatomy and function of respiratory system components

- Nasal cavity.
- Epiglottis.
- Pharynx.
- Larynx.
- Trachea.
- Bronchus.
- Bronchioles.
- Lungs (lobes).
- Alveoli.
- Diaphragm.
- Thoracic cavity.
- Pleura (visceral and parietal).
- Intercostal muscles (external and internal).

C2 Function of the respiratory system

Learners must understand the function of the respiratory system.

- Mechanisms of breathing (inspiration and expiration).
- Gaseous exchange (percentage of carbon dioxide and oxygen inspired and expired, diffusion of gases).
- Lung volumes (tidal volume, vital capacity and residual volume).

C3 Control of breathing

Learners must understand how breathing rate is controlled in response to exercise and sports performance.

- Neural (medulla oblongata as the respiratory centre in the brain).
- Chemical (chemoreceptors detect change in blood carbon dioxide concentrations and changes in pH).

D Anatomy of the skeletal system

D1 Anatomy of the bone

Learners must understand bone anatomy.

- Long bone:
 - periosteum
 - bone minerals
 - bone marrow
 - epiphysis
 - growth plates
 - diaphysis
 - cancellous bone
 - compact bone
 - articular cartilage.
- Bony landmarks:
 - notches
 - fossae
 - condyles
 - processes
 - tuberosity.

D2 Process of bone growth and remodelling

- Cells involved in bone growth and ossification (osteoclasts, osteoblasts, osteocytes).
- Bone growth (growth plates, epiphysis).
- Bone remodelling.
- Uptake of minerals (calcium, vitamin D).

D3 Location of skeletal bones

- Learners must understand the location of bones in the skeletal system:
 - cranium
 - clavicle
 - ribs
 - sternum
 - scapula
 - humerus
 - radius
 - ulna
 - carpals
 - metacarpals
 - phalanges
 - pelvis (ilium, ischium, pubis, iliac crest)
 - vertebral column (cervical, thoracic, lumbar, sacrum, coccyx, curves of the spine)
 - femur
 - patella
 - tibia
 - fibula
 - tarsals
 - calcaneus
 - metatarsals
 - bones that form the axial skeleton
 - bones that form the appendicular skeleton.

- Types of bone:
 - long
 - short
 - flat
 - sesamoid
 - irregular.

D4 Ligaments

Learners must understand the role of ligaments in the skeletal system.

- Function of ligaments.
- Location of ligaments in stabilising and restricting joint movements.

D5 Joints

Learners must understand how joints of the skeleton are used in sport and exercise techniques and actions.

- Classification of joints:
 - fibrous (fixed)
 - cartilaginous (slightly moveable)
 - synovial (freely moveable).
- Types of synovial joints:
 - ball and socket
 - condyloid
 - gliding
 - saddle
 - hinge
 - pivot.
- Structure of synovial joints and the function of their components in sport and exercise:
 - joint capsule
 - bursa
 - articular cartilage
 - synovial membrane
 - synovial fluid
 - ligaments.
- Range of movement at synovial joints due to shape of articulating bones and use in sport and exercise.

D6 Function of skeletal system

Learners must understand the functions of the skeleton.

- Functions of the skeleton:
 - supporting framework
 - protection
 - attachment for skeletal muscle
 - source of blood cell production
 - store of minerals
 - movement.

E Anatomy of the muscular system

E1 Muscle types

Learners must understand the different muscle types.

- Cardiac (non-fatiguing, involuntary).
- Skeletal (fatiguing, voluntary).
- Smooth (involuntary).
- Skeletal muscle fibre types (type I, type IIa type IIx).
- Anatomy of the skeletal muscle (epimysium, perimysium, endomysium, fascicle).

E2 Neuromuscular process of muscle contraction

- Neuromuscular control:
 - nerve impulse and action potential
 - neuromuscular junction (synapses)
 - neurotransmitter (acetylcholine).
- Sliding filament theory:
 - calcium ions
 - myofibril
 - sarcomere
 - actin
 - myosin
 - cross-bridges
 - H zone
 - Z line
 - A band
 - I band
 - troponin
 - tropomyosin
 - ATPase
 - ATP.
- Types of muscle contraction:
 - isometric
 - concentric
 - eccentric.
- Muscle fibre type recruitment:
 - recruitment at different levels of intensity of exercise.

E3 Location of skeletal muscles

Learners must know the location and action of skeletal muscle:

- deltoids (posterior, anterior, medial)
- medial and lateral shoulder rotators
- biceps brachii
- triceps brachii
- wrist flexors
- wrist extensors
- forearm supinators
- forearm pronators
- sternocleidomastoid
- pectoralis major
- rectus abdominis
- obliques
- transverse abdominis (TVA)

- quadriceps (rectus femoris, vastus medialis, vastus lateralis, vastus intermedius)
- iliopsoas
- tibialis anterior
- erector spinae
- trapezius
- rhomboids
- latissimus dorsi
- gluteals (gluteus maximus, gluteus medius, gluteus minimus)
- hamstrings (biceps femoris, semitendinosus, semimembranosus)
- gastrocnemius
- soleus.

E4 Antagonistic muscle pairs

Learners must understand movement of muscles in antagonistic pairs and their use in sport and exercise:

- agonist
- antagonist
- synergist
- fixator.

E5 Types of movement

Learners must understand the different types of movement with application of anatomical terminology:

- flexion (horizontal flexion, hip flexion, shoulder flexion, plantarflexion, dorsiflexion, lateral flexion)
- extension (hyperextension, horizontal extension, hip extension, shoulder extension)
- abduction
- adduction
- rotation (medial and lateral)
- circumduction
- pronation
- supination
- elevation
- depression
- protraction
- retraction.

E6 Planes of movement

- Description of planes:
 - sagittal plane
 - frontal plane
 - transverse plane.
- Types of movement in each plane:
 - sagittal plane – flexion and extension related movements
 - frontal plane – abduction and adduction related movements
 - transverse plane – rotation related movement.

F Analysis of the skeletal and muscular systems and how they produce movements in sport and exercise

F1 Phases of sport and exercise movement

Learners must understand the application of the muscular and skeletal systems to each phase of movement using anatomical language.

- Phases appropriate to the movement:
 - preparation
 - execution
 - follow through.

F2 Interrelationship of the muscular and skeletal systems in movement analysis

Learners must understand how the muscular and skeletal systems work together in each phase of a movement.

- Body sections for analysis:
 - upper body
 - trunk
 - lower body.
- Bones involved in movement:
 - type of bone.
- Muscles involved in movement:
 - role/function of antagonistic pairs
 - role/function of synergist muscles
 - role/function of fixator muscles
 - types of contraction.
- Joints involved in movement:
 - type of joint
 - bones forming each joint
 - range of movement permitted at each joint.
- Type of movements.
- Planes of movement.
- Movement efficiency:
 - dynamic (balanced) stability at joints and mobility at other joints
 - kinetic chain
 - transfer of movement across body segments
 - muscle balance.

Grade descriptors

To achieve a grade a learner is expected to demonstrate these attributes across the essential content of the unit. The principle of best fit will apply in awarding grades.

Level 3 Pass

Learners demonstrate knowledge of functional anatomy and apply it to exercise and sports performance. They have a sound understanding of the structures, functions and characteristics of the anatomical systems and are able to apply this to a range of familiar and unfamiliar contexts. Learners can interpret information related to exercise and sports performance and make judgements on how the anatomical systems allow for movements to be carried out.

Level 3 Distinction

Learners demonstrate thorough knowledge and understanding of the anatomical systems in exercise and sports performance and can apply this to a range of familiar and unfamiliar contexts. Learners are able to analyse how the body carries out exercise and sporting movements.

Learners will be able to interpret information on exercise and sports performance and be able to make reasoned judgements on how anatomical systems carry out exercise and sporting movements in a range of different contexts. They will demonstrate understanding of the interrelationships between the anatomical systems.

Key terms typically used in assessment

The following table shows the key terms that will be used consistently by Pearson in our assessments to ensure students are rewarded for demonstrating the necessary skills.

Please note: the list below will not necessarily be used in every paper/session and is provided for guidance only.

Command or term	Definition
Analyse	Learners examine in detail, in order to discover the meaning or essential features of a theme, topic or situation, or break something down into its components or examining factors methodically and in detail. To identify separate factors, say how they are related and explain how each one contributes to the topic.
Assess	Learners present a careful consideration of varied factors or events that apply to a specific situation or identifies those which are the most important or relevant to arrive at a conclusion.
Describe	Learners give an account, or details, of 'something' or give an account of a 'process'.
Discuss	Learners identify the issue/situation/problem/argument that is being assessed in the question given, exploring all aspects and investigating fully.

Command or term	Definition
Evaluate	Learners review information before bringing it together to form a conclusion or come to a supported judgement of a subject's qualities in relation to its context, drawing on evidence: strengths, weaknesses, alternative actions, relevant data or information.
Explain	Learners convey understanding by making a point/statement or by linking the point/statement with a justification/expansion.
Give	Learners can provide examples, justifications and/or reasons to a context.
Identify	Learners assess factual information that may require a single word answer, although sometimes a few words or a maximum of a single sentence are required.
State/name	Learners give a definition or example.
To what extent	Learners review information then bring it together to form a judgement or conclusion, following the provision of a balanced and reasoned argument.

Links to other units

This is a mandatory unit and underpins knowledge throughout the qualification.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit.

Unit 3: Applied Sport and Exercise Psychology

Level: **3**

Unit type: **External**

Guided learning hours: **120**

Unit in brief

This unit covers the major psychological factors that can affect performers in sport and exercise environments, and the interventions that can promote an appropriate mindset.

Unit introduction

Success in sport is dependent on a series of scientific factors. Performers need to be prepared physically, have the correct technique and follow an appropriate nutritional strategy. Performers must also approach performance with the correct mindset and be able to manage their thoughts and feelings during competition and training sessions.

In this unit, you will develop an understanding of the major psychological factors that impact on sports performers. You will examine the predominant theories that help us to understand these factors, how they can affect sports performers positively and negatively, and the interventions that can be used to control psychological state. You will start by examining motivation, which is the force that underpins all the thoughts and feelings of an individual, and look at the different ways to motivate people. You will examine stress, arousal and anxiety which can result from performing in highly pressurised, competitive environments, and the relationship of each one to optimal performance. You will explore other key concepts, such as self-confidence and mindset, and develop an understanding of how they can impact on performance. You will also focus on the functioning of sports groups and teams and how their outcomes can be influenced by cohesion and styles of leadership. Finally, you will be introduced to a range of psychological interventions and how they can be applied to support sports performers in achieving optimal outcomes.

This unit will give you a sound foundation for progression to higher education and employment. The application of sports psychology knowledge is invaluable for sports performers and for a range of sporting careers such as sports coaching, sports leadership and fitness training.

Summary of assessment

This unit will be assessed through a single part task, written and marked by Pearson. This single part task will be taken under supervised conditions in a single session of 3 hours timetabled by Pearson.

Please see *Issue 2* of the Sample Assessment Material to help prepare learners for assessment.

The number of marks for both versions of the task is 60.

The assessment availability is December/January and May/June each year.

Assessment outcomes

AO1 Demonstrate knowledge and understanding of psychological factors, concepts, interventions and theories in sport and exercise activities

AO2 Apply knowledge and understanding of psychological factors, concepts, interventions and theories, and their influence in sport and exercise activities on real-life sporting contexts

AO3 Analyse and evaluate information related to individuals or teams to determine appropriate psychological interventions

AO4 Be able to recommend psychological interventions underpinned by theory and in context with appropriate justification

Essential content

The essential content is set out under content areas. Learners must cover all specified content before the assessment.

A Motivation for sports and exercise

A1 Types of motivation

Understand the motivation of individuals and teams and its effect on sports performance and exercise.

- Different types of motivation:
 - intrinsic
 - extrinsic
 - amotivation.
- Relationship between different types of motivation.

A2 Theories of motivation

Understand how theories are applied in sport and exercise environments.

- Need Achievement Theory:
 - need to achieve success
 - need to avoid failure.
- Achievement Goal Theory:
 - task orientation
 - outcome or ego orientation.
- Self-determination theory.
- Weiner's attribution theory.

A3 Motivational environment and its influence on sports performers

Understand the variety of influences on sports performers, and how they affect motivation and their links to theories of motivation.

- The influence of coach, teacher or instructor on motivation:
 - mastery climate and use of TARGET (task, authority, reward, grouping, evaluation and timing)
 - competitive climate.
- The influence of family and peers on motivation.
- The influence of personality on motivation (traits, social learning).
- The influence of the physical environment on motivation.

A4 Signs and effects of over-motivation

Understand the effects of over-motivation on sports and exercise performance.

- Over-motivation.
- Signs of over-motivation:
 - over-training
 - training addiction
 - social withdrawal.
- Effects of over-motivation:
 - over-confidence
 - decrement in performance
 - burnout
 - injury.

B Competitive pressure in sport

B1 Theories of arousal-performance relationship

- Definition of arousal.
- Theories of arousal-performance relationship:
 - drive theory
 - inverted-U hypothesis
 - catastrophe theory
 - individual zones of optimal functioning.
- Effects of changes in arousal on sports performance:
 - improvements or decrements in performance
 - changes in attentional focus
 - increase in stress and anxiety levels
 - experience of flow states
 - choking.

B2 Stress and anxiety on sports performance

Understand stress and anxiety, and their impact on the sports performer.

- Stress:
 - the four-stage stress process
 - eustress and distress.
- Anxiety:
 - state and trait
 - cognitive, somatic and behavioural
 - competitive anxiety
 - multidimensional anxiety theory
 - reversal theory.
- Sources of stress:
 - internal
 - external.
- Symptoms of stress and anxiety:
 - fight or flight response
 - cognitive
 - somatic
 - behavioural.

B3 Consequences of stress and anxiety

Understand how and why stress and anxiety affect sports performance.

- Positive consequences of stress and anxiety:
 - positive mental state
 - increase of self-confidence
 - improvement in performance
 - increased energy
 - increased motivation
 - increased focus.
- Negative consequences of stress and anxiety:
 - negative mental state
 - loss of self-confidence
 - decrement in performance
 - possible injury
 - aggression.

B4 Aggression as a response to competitive pressure

Understand different types of aggression and why sport performers may behave aggressively.

- Types:
 - assertive behaviour
 - instrumental
 - hostile
 - relational.
- Theories:
 - instinct
 - social learning
 - frustration-aggression theory
 - adapted frustration-aggression theory.

C Effects of self-confidence, self-efficacy and self-esteem on sport and exercise performance**C1 Self-confidence and sport and exercise performance**

- Definition of self-confidence.
- Vealey's Multidimensional Model of Sport Confidence.
- Impact of different levels of self-confidence on sport and exercise performance:
 - optimal self-confidence
 - low self-confidence
 - over-confidence.
- Influence of expectations on sport and exercise performance:
 - expectations of self
 - expectations of coach.

C2 Self-efficacy in sport and exercise performance

Understand the factors influencing self-efficacy and their links to other psychological theories.

- Definition of self-efficacy.
- Bandura's Self-efficacy Theory:
 - performance accomplishments
 - vicarious experiences
 - verbal persuasion
 - emotional arousal
 - efficacy expectations
 - athletic performance.
- Application of the model and its impact on sport and exercise performance.

C3 Self-esteem and its impact on sport and exercise performance

- Definition of self-esteem.
- Impact of self-esteem.

D Mindset in sport and exercise performance

D1 Growth mindset versus fixed mindset

Understand growth mindset versus fixed mindset and how they influence behaviour in sport and exercise environments.

- Dweck's Theory:
 - fixed mindset
 - growth mindset
 - talent versus effort
 - 10 000 hours practice
 - learned helplessness.
- Application and its impact on sport and exercise skill development.

D2 Resilience in sport

- Definition of resilience.
- Importance of resilience in sport.
- Overcoming adversity:
 - injury
 - burnout
 - slump in form
 - transitions.

D3 Perfectionism

- Analyse the behaviours of the perfectionist in relation to sport and fitness activities.
- Traits of a perfectionist.
- Functional perfectionism.
- Dysfunctional perfectionism.
- Impact of perfectionism on performance.

E Group dynamics in sport

E1 Group processes

- Tuckman's stages of group development.
- Interactive and coactive groups and teams.
- Ringelmann effect and social loafing.

E2 Cohesion

- Carron's conceptual model of cohesion.
- Task and social cohesion.
- Relationship between cohesion and sports performance.

E3 Leadership

- Types of leader:
 - emergent versus prescribed
 - autocratic versus democratic.
- Chelladurai's multidimensional model of leadership:
 - antecedents
 - leader behaviour
 - consequences.
- Application to performance of sports groups and teams:
 - appropriate attentional focus
 - commitment and determination.

F Psychological interventions for sports performance and exercise

Understand psychological interventions and their appropriate application to sports and exercise performers.

F1 Aims of psychological interventions

To develop the characteristics of successful sports performers:

- high motivation
- self-regulation of arousal levels
- positive thoughts
- high levels of self-confidence.

F2 Performance profiling

Understand how principles of performance profiling are applied in sport and exercise settings.

- Applications of performance profiling:
 - providing motivation to improve
 - providing a basis for goal setting
 - identifying psychological strengths and weaknesses
 - develops athlete's self-awareness
 - can be used to monitor and evaluate progress.
- Process of performance profiling:
 - introducing performance profiling
 - eliciting constructs
 - assessment of constructs
 - utilising results from assessment.

F3 Goal setting

Understand how the principles of goal setting are applied in sport and exercise environments for individuals and groups.

- Timescale for goals:
 - short-, medium-, long term.
- Types of goals:
 - performance, outcome and process
 - mastery and competitive.
- Principles of goal setting:
 - SMARTS – specific, measurable, action orientated, realistic, time constrained, self-determined.

F4 Imagery in sport and exercise

Understand how and why imagery is used in sport and exercise settings.

- Definition of imagery.
- Types of imagery:
 - visual (internal and external perspectives)
 - auditory
 - kinaesthetic.
- Uses of imagery:
 - reducing anxiety and stress
 - influencing self-confidence
 - imagining goals
 - mental rehearsal
 - pre-performance routines.

F5 Self-talk in sports and exercise

- Definition of self-talk.
- Types of self-talk:
 - positive
 - negative.
- Uses of self-talk:
 - self-confidence
 - arousal control
 - pre-performance routines.

F6 Arousal control techniques in sport and exercise

Understand different arousal control techniques and their appropriate application in sport and exercise settings.

- Relaxation techniques:
 - progressive muscular relaxation
 - mind-to-muscle techniques (imagery)
 - breathing control.
- Energising techniques:
 - increasing breathing rate
 - pep talks (self-talk)
 - listening to music
 - use of energising imagery
 - positive statements.

Grade descriptors

To achieve a grade a learner is expected to demonstrate these attributes across the essential content of the unit. The principle of best fit will apply in awarding grades.

Level 3 Pass

Learners are able to demonstrate knowledge and understanding of psychological factors and concepts, and can apply them in context. They can identify factors and interpret the impact and influence that they have on the performance of an individual or team in context. Learners will be able to rationalise the approach required in different sport and exercise situations. They will be able to apply psychological theories to propose and rationalise psychological interventions that are relevant to the scenario, demonstrating an understanding of the principles behind those interventions.

Level 3 Distinction

Learners are able to critically evaluate information in context, relating to improving the performance of a team or individual. They can identify psychological factors and provide a detailed interpretation of the impact and influence that they have on the performance of an individual or team in context. Learners can prioritise the psychological factors based on their significance in relation to the effect on individual and/or team performance. They show a thorough understanding of psychological theories and can apply them to propose, prioritise and justify psychological interventions that are relevant to the scenario, demonstrating a detailed understanding of the principles behind those interventions.

Key terms typically used in assessment

The following table shows the key terms that will be used consistently by Pearson in our assessments to ensure students are rewarded for demonstrating the necessary skills.

Please note: the list below will not necessarily be used in every paper/session and is provided for guidance only.

Command or term	Definition
Analyse	Learners give reasons or evidence to: <ul style="list-style-type: none"> • support an opinion and or decision • prove something right or reasonable.
Evaluate	Learners' work draws on varied information, themes or concepts to consider wider aspects such as: <ul style="list-style-type: none"> • strengths or weaknesses • advantages or disadvantages • alternative actions • relevance or significance. The inquiry should lead to a supported judgement showing relationship to its context. This will often be in a conclusion.
Interpretation	Learners are able to draw the meaning, purpose or qualities of something from stimulus.
Intervention	An action performed to bring about change in people or teams.

Command or term	Definition
Justification/rationalisation	Learners give reasons or evidence to: <ul style="list-style-type: none"> • support an opinion and or decision • prove something right or reasonable.
Psychological factors	Examples are motivation, anxiety, arousal, stress, self-confidence, mindset, aggression.
Relevance	Important to the matter at hand.
Recommend	Learners put forward (someone or something) with approval as being suitable for a particular purpose or role.

Links to other units

This unit links to:

- Unit 5: Applied Research Methods in Sport and Exercise Science
- Unit 6: Coaching for Performance and Fitness
- Unit 8: Specialised Fitness Training
- Unit 9: Research Project in Sport and Exercise Science
- Unit 10: Physical Activity for Individual and Group-based Exercise
- Unit 11: Sports Massage
- Unit 12: Sociocultural Issues in Sport and Exercise.
- Unit 15: Sports Injury and Assessment.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities.

This unit would benefit from employer involvement in the form of guest speakers.

Unit 4: Field and Laboratory-based Fitness Testing

Level: **3**

Unit type: **Internal**

Guided learning hours: **90**

Unit in brief

Learners will become familiar with the essential testing protocols commonly used in both the field and laboratory to assess the fitness of the modern performer.

Unit introduction

Understanding the role of a sports scientist or allied health practitioner is paramount in monitoring and evaluating an individual's sport and exercise performance. Using a range of assessment methods, this unit will apply testing protocols commonly used by the sports scientist and health professional in both field- and laboratory-based settings. The unit will explore the use of clinical assessments to enable you to appreciate the stages involved when planning, administering and interpreting the outcome of testing protocols.

You will develop the understanding and practical skills necessary to accurately conduct anthropometric and fitness assessment protocols that establish body composition and density, identify somatotype body types and profile a performer's fitness capacity. You will become familiar with a variety of testing procedures and will be able to replicate them under scientific conditions. You will gain clinical skills in order to be proficient in the preparation, testing, data handling and critical analysis of applied assessment methods. From the data produced through practical field- and laboratory-based testing, you will profile a selected sports performer.

This unit focuses specifically on the practical aspects used by both the sports scientist and allied practitioner. These skills and methods will enable you to expand on your understanding of safe and ethical working practice, testing protocols and data evaluation skills that are essential for the sports scientist. These activities will prepare you for a variety of careers, and form a good basis for higher education study in sport and further sport and exercise science qualifications, such as sport and exercise science.

Learning aims

In this unit you will:

- A** Examine the preparation required prior to sport and exercise field- and laboratory-based testing
- B** Undertake anthropometry and somatotype testing procedures in sport
- C** Explore the use of field- and laboratory-based protocols in sport and exercise sciences
- D** Explore profiling of a sports performer following a practical research design using field- and laboratory-based testing.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Examine the preparation required prior to sport and exercise field- and laboratory-based testing	<p>A1 Health and safety in a sport and exercise laboratory</p> <p>A2 Ethical considerations when conducting sport and exercise testing</p> <p>A3 Validity and reliability of testing protocols when conducting sport and exercise assessments</p>	A written report examining the health, safety, risk, ethical considerations and assessment variables.
B Undertake anthropometry and somatotype testing procedures in sport	<p>B1 Anthropometric assessment methods applied within the sport and exercise laboratory</p> <p>B2 Somatotype profiling applied within the sport and exercise laboratory</p>	A report evaluating the use of testing protocols and recorded data in predicting sports performance, supported by observation/video evidence of fitness testing administration and recorded results from each test.
C Explore the use of field- and laboratory-based protocols in sport and exercise sciences	<p>C1 Applied laboratory and experimental testing</p> <p>C2 Experimental data collection methods used within the sport and exercise laboratory</p> <p>C3 Data handling and evaluation of outcomes when conducting laboratory experimentation</p>	A report evaluating the use and outcomes of field- and laboratory-based testing and formal research design. The report will justify the protocols used and will be supported by observation through video evidence of fitness-testing administration and recorded results from each test.
D Explore profiling of a sports performer following a practical research design using field- and laboratory-based testing	<p>D1 Scientific application of experimental protocols in sport and exercise science</p> <p>D2 Performance profiling through research design</p>	An evaluative report focusing on the effectiveness of client profiles created using field- and laboratory-based testing protocols.

Content

Learning aim A: Examine the preparation required prior to sport and exercise field- and laboratory-based testing

A1 Health and safety in a sport and exercise laboratory

The importance of health and safety should be discussed, highlighting the need to protect both the technician and subject during each protocol.

- Health and safety: precautions, management, roles and responsibilities of the technician, equipment safety.
- Risk management: risk-assessment procedures, accident forms, safety when preparing testing protocols, safety when carrying out testing protocols, emergency and first-aid procedures for participant safety, testing termination.
- Testing environment: hygiene, cross-contamination (implications for testing protocols), stable conditions, surface conditions, temperature conditions.
- Equipment preparation: equipment safety, safety checks, calibration, fitness for purpose, equipment condition.
- Testing questionnaires: subject health-screening (qualitative), physical activity readiness questionnaire (PAR-Q), health questionnaires, lifestyle questionnaires, medical questionnaires.
- Subject preparation: pre-test health-check measures (quantitative), heart rate, blood pressure, height, weight, body mass index (BMI), informed consent, subject disclaimer, appropriate testing attire.

A2 Ethical considerations when conducting sport and exercise testing

Ethical considerations should be discussed in order to appreciate the importance of following appropriate standards and legislation.

- Security: data recording expectations, anonymity requirements, subject confidentiality (individual recorded as subject and not by name), data storage, data protection responsibilities.
- Protocol familiarisation: informed consent procedures, ethical clearance.
- Subject welfare: prior to and during testing protocols, DBS checks, individual needs, disability considerations, age group considerations, child protection policies.
- Ethics form: completion stages, use prior to testing, ethical policies when testing.

A3 Validity and reliability of testing protocols when conducting sport and exercise assessments

Considerations of validity and reliability should be highlighted in order to provide accurate and meaningful research within both field- and laboratory-based testing.

- Validity: definitions and terminology, applications within testing, equipment suitability, calibration of equipment, protocol familiarisation, pre-test preparation, acceptable data differences between testing protocols.
- Reliability: definitions and terminology, testing consistency, equipment suitability, repetitive measures, acceptable data differences between testing protocols.
- Testing variables: environmental considerations, performer motivation and behaviour, pre-test physical condition, protocol suitability, growth and maturation.

Learning aim B: Undertake anthropometry and somatotype testing procedures in sport

B1 Anthropometric assessment methods applied within the sport and exercise laboratory

Practical application of anthropometric assessment protocols following testing protocols in order to establish body shape and proportions.

- Anthropometry: applications to the individual, outcomes of an assessment, health implications, sport science implications.

- Testing guidelines: client care, subject differentiation, skinfold measures, anthropometric test guidelines, appropriate use and applications of protocols.
- Methods of measurement: Durnin and Womersley skinfold method, Jackson and Pollock skinfold method, male and female method differentiation, nomograms, Siri equation, Sloan equation.
- Body mass measures: ponderal index, BMI, muscle-mass calculations, bioelectrical impedance analysis (BIA), familiarity with hydrostatic weighing, waist-hip ratio.
- Anthropometry testing: testing calculations, sources of error, repetitive testing.

B2 Somatotype profiling applied within the sport and exercise laboratory

Individual profiling to be discussed, with reference made to classification of body shape and proportions.

- Testing preparation: informed consent, health screening, data recording sheets, established norms for gender and age.
- Somatotype: characteristics of the body, features and appearance, body types (endomorph, mesomorph and ectomorph).
- Measurement: Heath-Carter anthropometric somatotype measures (use of Heath-Carter somatotype rating form); skinfold measures; height, weight, limb length and girth measures; somatotype calculations.
- Somatotype profiling: plotting a somatotype chart, following appropriate calculations, performer profiling, sporting implications, health implications, medical implications (diabetes, heart conditions, blood pressure).

Learning aim C: Explore the use of field- and laboratory-based protocols in sport and exercise sciences

C1 Applied laboratory and experimental testing

Practical application of field- and laboratory-based tests should be discussed and engaged in using a variety of testing protocols.

- Testing preparation: informed consent, health screening, data-recording sheets, ethical procedures.
- Laboratory-based testing protocols: Astrand-Rhyming cycle ergometer test, 30-second Wingate cycle test, vertical jump test, 1RM tests, back dynamometer, grip dynamometer, BMI assessments, bioelectrical impedance analysis, one-minute press-up test, one-minute sit-up test, static flexibility testing, goniometer testing, sit-and-reach test.
- Field-based testing protocols: multistage fitness test, 12-minute run, running-based anaerobic sprint test (RAST), flying 30 m sprint, Illinois agility test and T-drill test.
- Testing protocols: aerobic maximal oxygen uptake methods (VO_2), Douglas bag testing protocols and administration, blood lactate testing and administration, respiratory and lung function testing, metabolic cost testing and calculation, isokinetic testing and administration.
- Protocol considerations: assessing performance of children, team game assessment.

C2 Experimental data collection methods used within the sport and exercise laboratory

Data-handling skills to be discussed and guidelines on recording protocols to be highlighted in order to accurately record experimental outcomes.

- Units of measurement: mass and weight, length and height, distance and displacement, force, work, power, energy, speed and velocity, angular velocity, torque, volume, pressure, temperature.
- Data-recording techniques: collection methods, spreadsheets, correct use of units, tables, databases, recording, appropriate ICT use.
- Data handling: appropriate testing design (valid and reliable), normative data (comparative norms, age norms, gender norms, ethnic norms), nomogram predictions, manual calculations of data.
- Ethical guidelines: individual referred to as participant or subject, record of preparation protocols, consent preparation, appropriate data storage.
- Data collection: experimental errors and testing accuracy, protocol variations.

C3 Data handling and evaluation of outcomes when conducting laboratory experimentation

Data evaluation should focus on the experimental data outcomes that will be produced by accurately following appropriate testing procedures.

- Interpretation of results: normative data considerations, evaluations and judgements against population norms, comparative sports performers and elite athletes, comparative health ranges.
- Statistical interpretation: data calculations for interpretation, mode, mean, median, range, establish relationships and differences, standard deviation, t-tests, critical values, Pearson product-moment correlation coefficient (Pearson's r), comparative norms testing.
- Evaluation: outcomes of findings, evaluation of success or failure, achievement of experimental aims and objectives, evidence and findings, assessments of validity, reliability, difficulties, drawing conclusions.
- Significance of findings: review of study aims, application of research results, sporting and health implications, limitations of the investigation, improvements, suggested changes.

Learning aim D: Explore profiling of a sports performer following a practical research design using field- and laboratory-based testing

D1 Scientific application of experimental protocols in sport and exercise science

Practical application of testing methods should be explored to allow for confident, self-driven experimental laboratory- and field-based testing.

- Practical research design: title, aims, introduction, method, results, analysis, discussion, conclusion, research evidence (references/bibliography).
- Testing protocol: implement research design, protocol procedures, health and safety, ethical considerations, valid and reliable fitness-assessment measures.
- Data collection: appropriate methods for data collection, accurate recording techniques, use of appropriate format, use of correct units, evidence of raw data collection, methodological problem analysis.
- Data presentation: use of appropriate data tables, bar charts, histograms, cumulative frequency graphs, normal distribution, positively skewed curves, negatively skewed curves.

D2 Performance profiling through research design

- Aims of performance profiling: improve individual performance, agreed development plan/strategies, performance training and development.
- Process of profile construction: testing data analysis, selection of key characteristics, identification of appropriate components.
- Normative data comparisons: established performance norms, performance characteristics.
- Qualitative and quantitative measures: establishing priorities, identifying strengths and weaknesses, agreed goals.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Examine the preparation required prior to sport and exercise field- and laboratory-based testing		A.D1 Evaluate pre-test procedures that can be used to ensure testing is conducted in a safe, valid, reliable and ethical way, justifying their choices.
A.P1 Explain the procedures that should be completed prior to laboratory testing. A.P2 Explain how validity, reliability and ethical considerations impact on field and laboratory testing.	A.M1 Recommend pre-test procedures that can be used to ensure testing is conducted in a safe, valid, reliable and ethical way.	
Learning aim B: Undertake anthropometry and somatotype testing procedures in sport		B.D2 Evaluate the use of anthropometric assessment and somatotype testing protocols, justifying how their own results could predict sport and exercise performance.
B.P3 Explain how anthropometric assessment and somatotype testing protocols are used in laboratory-based testing. B.P4 Perform three contrasting anthropometric assessment protocols and a somatotype assessment protocol following the correct procedures, recording the results in an appropriate format.	B.M2 Assess the suitability of anthropometric assessment and somatotype testing protocols that are used in laboratory-based testing. B.M3 Perform three contrasting anthropometric assessment protocols and a somatotype assessment protocol, calculating the test results with accuracy.	
Learning aim C: Explore the use of field- and laboratory-based protocols in sport and exercise sciences		C.D3 Evaluate the data produced from six field- and laboratory-based testing protocols using statistical calculations, justifying the protocols used with reference to the prediction of sport and exercise performance. D.D4 Evaluate the effectiveness of creating performer profiles from anthropometric assessment, somatotype testing and field- and laboratory-based testing protocols in the prediction of sport and exercise performance.
C.P5 Conduct six field- and laboratory-based testing protocols following the correct procedures and record the results in an appropriate format.	C.M4 Conduct six field- and laboratory-based testing protocols, ensuring the test results are calculated with accuracy.	
Learning aim D: Explore profiling of a sports performer following a practical research design using field and laboratory-based testing		
D.P6 Create a profile for a selected sports performer following the implementation of a practical research design using appropriate laboratory- and field-based protocols.	D.M5 Analyse the practical research design followed when creating the profile, making recommendations for future testing.	

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of three summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim: A (A.P1, A.P2, A.M1, A.D1)

Learning aim: B (B.P3, B.P4, B.M2, B.M3, B.D2)

Learning aims: C and D (C.P5, D.P6, C.M4, D.M5, C.D3, D.D4)

Further information for teachers and assessors

Resource requirements

For this unit, learners must have access to:

- a well-equipped gym and fitness suite
- an appropriate area, such as a sports hall and an outdoor facility, to perform a variety of practical tests.

The facilities should include access to a range of kinanthropometric equipment, such as skinfold callipers, stadiometers and scales, measuring tapes, BIA machines and bone diameter callipers. Further equipment should include stopwatches, blood-pressure measuring equipment, heart-rate monitors and finger pulse oximeters, a multistage fitness test package and cycle ergometers, including Wingate software testing.

Learners will need to use the Heath-Carter (1967) anthropometric somatotype rating form and somatochart to conduct the anthropometric somatotype method.

It would be beneficial for learners if they could access exemplar informed consent forms, and risk assessment and ethics forms to aid their pre-test preparation. Access to normative data for fitness interpretation and data for elite performers would be advantageous. Access to a statistical package such as the Statistical Package for the Social Sciences (SPSS) would aid the interpretation of data, although statistical tests can also be performed using other software applications.

Essential information for assessment decisions

Learning aim A

Learners are encouraged to be proactive during practical-based activities and to embrace the application of field and laboratory testing in sport and exercise science. Their work should be appropriately presented and well structured, with numbered pages and correct spelling and punctuation. Learners should provide the correct units of measurements throughout and develop a range of appropriate supplementary forms, along with any additional guidance prior to experimentation. They should be encouraged to provide full referencing from a variety of resources, for example books, journals and online resources to demonstrate evidence of wider reading.

For distinction standard, learners will evaluate the stages necessary for the safe preparation and application of testing, and justify its importance. They will demonstrate an excellent understanding of the procedures and policies that should be in place prior to laboratory testing, for example clear evidence of health screening with appropriate data recorded, PAR-Q, evidence of a comprehensive ethics form, participant consent information and a thorough risk assessment. Learners will clearly explain the procedures in detail and then justify their importance by making links to a code of practice and appropriate legislation, such as safeguarding and child protection policies. They will provide supplementary evidence using copies of screening forms, and their use of these will be clearly justified.

Learners will demonstrate a thorough understanding of validity and reliability, and will clearly define the terms as well as applying them in a practical context. Learners will differentiate between the terms, clearly explaining their importance and the potential influence they may have on the research design.

For merit standard, learners will make recommendations on the stages necessary for the safe preparation and application of testing. They will demonstrate a clear understanding of the procedures and policies that should be in place prior to laboratory testing, for example clear evidence of health screening with appropriate data recorded, appropriate use of a PAR-Q, evidence of a well-prepared ethics form, participant consent information and a thorough risk assessment. Learners will consider the procedures that should be followed and their importance within laboratory testing. Supplementary information could be provided, including evidence of forms, and their use will be clearly explained.

Learners will demonstrate an understanding of the importance of validity and reliability, and will be able to explain their impact on testing experimentation.

For pass standard, learners will consider each of the stages necessary for the safe preparation and application of testing. They will provide reasons why the procedures are used and evidence to support these, including health screening with appropriate data recorded, PAR-Q, a completed ethics form, participant consent information and a risk assessment.

Learners will consider validity and reliability, and make links to their impact on testing experimentation. They will be able to differentiate between each of the terms and give reasons to support their importance when preparing for testing.

Learning aim B

Learners will practically engage with the testing protocols in order to gather appropriate data for calculation and to provide an evaluation. Learners will use a diverse selection of anthropometric testing protocols in order to familiarise themselves with a variety of assessment techniques. Assessment of somatotype must follow the Heath-Carter protocol, collecting data, making calculations and plotting the resulting outcomes onto a somatochart. To be successful in this learning aim, it is imperative that learners engage with the practical activities. Their evidence will be appropriately presented and well structured, with numbered pages and correct spelling and punctuation. They will include the correct units of measurement, and appropriate table and chart sizes and annotations throughout their work. Learners should be encouraged to provide full referencing from a variety of resources – for example, books, journals and online resources – to demonstrate evidence of wider reading.

For distinction standard, learners will consider the use of anthropometric assessment and somatotype testing protocols, making judgements and drawing conclusions about the advantages and significance of these forms of measurement. They will give reasons to support how their results can be used to predict sporting performance. Learners will demonstrate a sound understanding of somatotyping and its use in sport and exercise. They will independently perform the appropriate assessment techniques with accuracy and correctly map the body for skinfold testing sites in order to gain reliable repeated measures during the data-gathering stage. Learners may provide appropriate diagrams to illustrate their knowledge of the sites. They will apply appropriate testing protocols with accuracy to produce reliable data that will be used to calculate an individual's somatotype. [‘With accuracy’ means that learners are expected to apply the protocols in a valid and reliable manner in order to achieve the expected results.] Evidence of an accurate Heath-Carter assessment record will be shown along with their calculations and resulting somatochart. The data will be accurately recorded, allowing for a detailed evaluation. Anthropometric testing outcomes will be linked to norms data where sport and exercise performance is used to extend the understanding of assessment profiling.

For merit standard, learners will carefully consider the suitability of anthropometric assessment and somatotype testing protocols, drawing conclusions as to the relevance of these measures. Learners will demonstrate the accurate collection and calculation of anthropometric data. Learners will demonstrate competence at gaining reliable repeated measures with consistency and accuracy. Learners will use assessment methods independently and present data in a suitable format allowing for an analysis to take place. They will demonstrate a clear understanding of somatotype and be competent in its prediction using the Heath-Carter assessment protocol. They will use the protocol calculations to accurately determine their individual somatotype.

For pass standard, learners will consider the use of anthropometric assessment and somatotype testing protocols in the context of field- and laboratory-based testing. They will give reasons as to why these measures are used.

Learners will use the appropriate testing protocol to collect anthropometric data. They will present and record data accurately, and in an appropriate format through the use of tables and charts. They will explain the meaning of the term somatotype and its individual components.

Learners will demonstrate the collection of data using the Heath-Carter protocol to calculate the predicted somatotype of a subject. The results gained will be presented accurately. Learners will present their work appropriately, including the correct labelling of units of measurement. Their tables and charts will be correctly annotated and they will provide some evidence of research.

Learning aims C and D

Learners will engage with a mini case study, evaluating their practical performance gained from six individual field- and laboratory-based testing protocols. The case study will follow a clear research design and aim to profile their performance across their peer group. A statistical analysis of the data outcomes could be conducted to draw appropriate conclusions and evaluate the study outcomes.

As well as conducting procedures, learners need to participate fully with the testing in order to gain a full learning experience. It is recommended that two of the six protocols are aerobic based and that learners use diverse protocols testing a broad range of fitness components. The report will be presented appropriately and will be well structured, with numbered pages throughout. Learners will use correct spelling and punctuation, and include the correct units of measurement and appropriate table and chart sizes and annotations throughout their work. They are encouraged to research their work from a variety of resources – for example, books, journals and online resources – which may be used to support a comprehensive evaluation of their work. It is envisaged that learners will critically evaluate the results produced while using sport and exercise performance as a focal point to evaluate the full study outcomes.

For distinction standard, learners will carefully consider the evidence produced from field- and laboratory-based testing protocols. From this evidence, they will make judgements about the strengths, weaknesses and significance of the outcomes in relation to the prediction of sport performance and the relevance of the protocols employed. They will then justify the protocols they have used, aiming to prove that they are reasonable and supportive when used in a field- and laboratory-based testing environment.

Learners will profile the performers and explore how their strengths and weaknesses may influence their success in a range of chosen sporting activities.

Learners will provide clear evidence of accurate preparation and planning of a mini case study that includes the presentation of six individual testing methods, two of which could be aerobic. They will provide a detailed account of the methodology used to complete them. There will be clear evidence of planning, with the study aims stated. Learners will implement their testing procedures independently using the correct protocol and equipment while ensuring that the data collected is both valid and reliable. Data will be recorded using a formal spreadsheet, and statistical calculations will be completed using recognised software packages. Such calculations could include standard deviation, Pearson's product-moment correlation coefficient (r) and t-tests, and could also use a range of graphical display methods such as correlation charts, graphs and tables.

Learners will use appropriate units of measurement when recording data, including the correct labelling of axes on graphs/charts and the correct presentation of tables. All data and graphs/charts must be clear for interpretation, for example, professionally displayed, of an appropriate size, and correctly labelled and annotated.

Learners will carefully consider how effective the creation and use of client profiles from field- and laboratory-based testing are in predicting sport performance. They will make judgements on the key strengths of the types of data collected from testing and draw conclusions on the value of creating profiles for the subjects from this data, supported by well-considered examples.

For merit standard, learners will provide evidence of preparation and planning of a mini case study. They will clearly present six individual testing methods, two of which could be aerobic, and will provide an explanation of the methodology used to complete them and to assess their suitability when planning their overall study aims. Learners will implement the testing procedures using the correct technique and equipment while ensuring the data collected is both valid and reliable. Data recording will be in the form of a formal spreadsheet and statistical calculations could be completed through the use of an appropriate software package. Such calculations may include standard deviation and Pearson's product-moment correlation coefficient (r), and may also use a range of graphical display methods such as correlation charts, graphs and tables.

Learners will accurately calculate the data findings in order to consider the outcomes of the case study, along with identifying the key strengths and areas for improvement for the practical research design based on the statistical calculations. They will profile the data to identify potential performance indicators and links may be made to its practical application – for example, power performance could indicate advantages in a range of sporting activities.

For pass standard, learners will conduct six individual testing methods, two of which should be aerobic. They will use the correct testing procedures and protocols, collecting valid and reliable data. The data will be appropriately recorded in the form of a spreadsheet and will include the correct units for each of the measurements gained. All tables will be correctly presented with an appropriate size and layout for ease of interpretation.

Learners will use the data collected to interpret the outcomes of the case study and to build a portfolio that identifies the sports performers' test results, making reference to the strengths and weaknesses of the performer.

Links to other units

This unit links to:

- Unit 1: Sport and Exercise Physiology
- Unit 2: Functional Anatomy
- Unit 5: Applied Research Methods in Sport and Exercise Science
- Unit 6: Coaching for Performance and Fitness
- Unit 8: Specialised Fitness Training
- Unit 9: Research Project in Sport and Exercise Science
- Unit 10: Physical Activity for Individual and Group-based Exercise
- Unit 14: Technology in Sport and Exercise
- Unit 15: Sports Injury and Assessment.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities.

This unit would benefit from employer involvement in the form of:

- guest speakers
- work experience.

Unit 5: Applied Research Methods in Sport and Exercise Science

Level: **3**

Unit type: **Internal**

Guided learning hours: **90**

Unit in brief

This unit covers the importance of research, factors affecting the quality of research and the different research methods used in sport.

Unit introduction

There has long been an appreciation of the role of research in sport and exercise sciences. Research has been central to the growth and development of each of the different disciplines in sport and exercise sciences, with sport and exercise scientists recognising the need for a strong evidence base behind their day-to-day work with clients. This evidence base helps sport and exercise scientists offer their clients the best quality of support. The first step towards this is having a clear understanding of and skill set in the area of research methods.

In this unit, you will develop a clear grasp of research methods, the different types of research, how to search for and read different examples of research, and the importance of this for emerging sport and exercise scientists. Following on from this, you will gain an understanding of the different factors that can affect the quality of research and the importance of ethical research practices. You will finish the unit by developing practical skills in the use of different research methods.

This combination of knowledge, understanding and skills will help prepare you for a range of careers or higher education courses in the sport and exercise sector.

Learning aims

In this unit you will:

- A** Understand the importance of research in sporting environments
- B** Examine key issues that impact on the effectiveness and quality of research in the sport and exercise sciences
- C** Examine the three main approaches to research in the sport and exercise sciences
- D** Apply appropriate research methods to a selected sport and exercise sciences-based research problem.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Understand the importance of research in sporting environments	A1 Introduction to research and the different types of research A2 The importance of research for individuals involved in sport and exercise science A3 The importance of using research to inform work with clients	A report that examines the importance of research when working with clients in sport-based settings and the key issues that affect the effectiveness of research.
B Examine key issues that impact on the effectiveness and quality of research in the sport and exercise sciences	B1 Validity, reliability, accuracy and precision in research B2 Ethical issues	
C Examine the three main approaches to research in the sport and exercise sciences	C1 Quantitative research C2 Qualitative research C3 Mixed-methods research	A presentation that introduces the main approaches to research in sport and exercise sciences and then presents the methods and results from an in-class mini investigation.
D Apply appropriate research methods to a selected sport and exercise sciences-based research problem	D1 Quantitative research designs D2 Quantitative data collection methods D3 Quantitative data analysis methods D4 Qualitative research designs D5 Qualitative data collection methods D6 Qualitative data analysis methods D7 Mixed-research designs D8 Mixed-research data collection D9 Mixed-research data analysis	

Content

Learning aim A: Understand the importance of research in sporting environments

A1 Introduction to research and the different types of research

- Considering definitions of research, e.g. a systematic process of discovery and advancement of knowledge, understanding and skills, guided by specific questions, problems or hypotheses.
- Types of research:
 - primary research – research that has involved collection of original data that is specific to a particular project
 - secondary research – research that uses existing sources of data rather than collecting original data.

A2 The importance of research for individuals involved in sport and exercise science

- Literature searching and reading appropriate sources of information to inform the development of sport and exercise science-based projects, e.g. basic versus advanced searches in search engines or journal databases, the use of keywords, filtering journals.
- Examples of how research has been used to develop knowledge and understanding.

A3 The importance of using research to inform work with clients

- How research has been used to benefit clients, e.g. understanding physiological benefits of different recovery strategies after sports performance, understanding why some athletes become aggressive while others do not.
- The concept of evidence-based practice (EBP) – the successful interaction of one's own knowledge and expertise with an appropriate external evidence base.
- The importance of EBP in sports environments.

Learning aim B: Examine key issues that impact on the effectiveness and quality of research in the sport and exercise sciences

B1 Validity, reliability, accuracy and precision in research

- Consideration of the definitions of validity: whether you are measuring what you intended to measure, the soundness of the interpretations of results of tests, a concept concerned with the conclusions drawn through research.
- Consideration of the definitions of reliability: consistency or repeatability of a measure or test, consistency or repeatability of results.
- Types of validity: internal validity, external validity, face validity, ecological validity.
- Types of reliability: test-retest reliability, inter-observer reliability, internal consistency reliability.
- Impact of accuracy and precision on validity.
- Impact of accuracy and precision on reliability.

B2 Ethical issues

- Definition of research ethics.
- Ethical issues as outlined by the British Association of Sport and Exercise Sciences (BASES) Code of Conduct: ethical clearance, informed consent and confidentiality, data protection and responsibility, competence, professional and personal conduct.
- Ethical issues as outlined by other professional sporting bodies and organisations.
- The impact of ethical issues in research settings, e.g. maintaining the safety and wellbeing of research participants, confidentiality of collecting/using data, helping to ensure that research is free from bias, ensuring the quality of data collection, ensuring maximum potential for research conclusions and interpretations, maintaining and enhancing the credibility of sport and exercise sciences as a professional discipline.

Learning aim C: Examine the three main approaches to research in the sport and exercise sciences

Throughout this learning aim, learners should use the different research methods in practical settings in order to develop their practical skills in using the methods, as opposed to simply understanding when to use them.

C1 Quantitative research

- Quantitative research: research that generates numerical data through measurement and statistical analysis, importance of accuracy and precision in measurement, deductive research, often larger sample sizes.
- Advantages of quantitative research: useful for researching large groups; allows the researcher to test (null) hypotheses and theories; allows the researcher to assess cause and effect; provides objective, numerical data, which some people see as more credible as it is more objective.
- Disadvantages of quantitative research: knowledge gained may be too general.

C2 Qualitative research

- Qualitative research: research that uses non-numerical data such as words, images or behaviours; often used to ascertain people's opinions, beliefs or emotions; inductive research; often smaller sample sizes.
- Advantages of qualitative research: can provide a richer or more in-depth understanding of a topic; can be flexible and dynamic in response to the needs of the participants, researchers or interim findings from data collection; helps researcher to understand how and/or why a phenomenon occurs.
- Disadvantages of qualitative research: data collection and analysis can be more time-consuming; knowledge and understanding gained may not be generalisable to other settings.

C3 Mixed-methods research

- Mixed-methods research: research that adopts and combines qualitative and quantitative principles and methods in the same study.
- Advantages of mixed-methods research: can add insight or understanding that may be missed if only a single method is used, can use the strengths of one method to overcome the weaknesses of another, can provide a stronger conclusion.
- Disadvantages of mixed-methods research: can be more time-consuming, can be more expensive, a single researcher may not be able to conduct both the qualitative and quantitative methods.

Learning aim D: Apply appropriate research methods to a selected sport and exercise sciences-based research problem

D1 Quantitative research designs

- Experimental research design: a design whereby the researcher assigns participants randomly to groups, manipulation of an independent variable to examine the effect on a dependent variable while controlling all other variables, importance of control groups.
- Cross-sectional/survey design: research that examines cross-sections of a population and aims to identify trends or relationships in populations, or to describe the characteristics of a population – often survey or questionnaire based.
- Longitudinal design: research design that involves measuring at different time points to see how variables change over an extended period (e.g. a number of weeks, months or years, depending on the project).

D2 Quantitative data collection methods

- Common quantitative data collection methods: laboratory based, field based, surveys.
- Uses, benefits and limitations of each type of data collection method.

D3 Quantitative data analysis methods

- Descriptive analysis: mean, median, mode, standard deviation.
- Organising data: range, rank order distribution, simple frequency distribution, grouped frequency distribution.
- Distribution curves: normal distribution, positively skewed, negatively skewed.
- Inferential statistics: parametric tests (dependent t-test, independent t-test, Pearson product-moment correlation coefficient), non-parametric tests (Wilcoxon matched pairs signed rank test, Mann-Whitney U test, Spearman's rank order correlation).
- Selecting appropriate inferential statistical tests.
- How to conduct appropriate inferential statistical tests.
- Practical meaningfulness statistics: percentage change, effect size.

D4 Qualitative research designs

Common qualitative designs:

- case study: a research design that involves the detailed investigation of a single case, such as a single team, an individual or a class in a school; or multiple case study, as for case study but involving two or more cases
- historical/retrospective design: a research design that aims to collect and analyse data relating to past events to try to explain how or why those events happened
- grounded theory: a research design that aims to develop a theory from the collected data
- ethnographic design: a research design that studies a group or a culture through becoming immersed with the group.

D5 Qualitative data collection methods

- Interviews:
 - individual interviews (structured, unstructured, semi-structured)
 - focus groups
 - advantages and disadvantages of interviews
 - conducting effective interviews.
- Observations:
 - non-participant observation: observing participants without engaging with the participants or the activity, advantages and disadvantages
 - participant observation: observing participants by engaging with the participants or activity to gain an understanding 'from the inside', advantages and disadvantages.

D6 Qualitative data analysis methods

- Appropriate methods of data analysis: content analysis, coding, thematic analysis.
- Stages of qualitative data analysis: data reduction, displaying data, drawing conclusions and verifying data.

D7 Mixed-research designs

Common mixed-research designs:

- sequential research design: using qualitative data collection and analysis techniques then following these up with quantitative data collection and analysis techniques (or vice versa)
- parallel research design: using qualitative and quantitative data collection and analysis techniques alongside each other.

D8 Mixed-research data collection

- Using appropriate qualitative and quantitative data collection methods either parallel to one another or sequentially, e.g. using qualitative interviews and quantitative surveys to examine student attitudes towards concussion in sport.

D9 Mixed-research data analysis

- Using appropriate qualitative and quantitative data analysis methods either parallel to one another or sequentially, e.g. using qualitative content analysis of interviews with descriptive and inferential statistics to examine student attitudes towards concussion in sport.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Understand the importance of research in sporting environments		
<p>A.P1 Explain the importance of research in sporting environments.</p> <p>A.P2 Explain the importance of using research to inform own work with clients in a sport and exercise science context.</p>	<p>A.M1 Analyse the importance of different types of research to inform own work with clients in a sport and exercise science context.</p>	
Learning aim B: Examine key issues that impact on the effectiveness and quality of research in the sport and exercise sciences		<p>A.D1 Evaluate the importance of research in sport and exercise science contexts, making justified conclusions.</p> <p>B.D2 Evaluate the importance of key issues that impact on the effectiveness and quality of research.</p>
<p>B.P3 Explain validity, reliability, accuracy and precision and their importance in sport and exercise sciences-based research.</p> <p>B.P4 Explain research ethics and their importance in sport and exercise sciences-based research.</p>	<p>B.M2 Analyse the relationship between validity, reliability, accuracy, precision, and the ability to conduct ethical research in sport and exercise sciences.</p>	
Learning aim C: Examine the three main approaches to research in the sport and exercise sciences		<p>CD.D3 Evaluate the choice of research approach, design and methods for a selected sport and exercise sciences-based research problem, justifying the research skills used.</p>
<p>C.P5 Explain the three main approaches to research in the context of sport and exercise sciences.</p> <p>C.P6 Explain the advantages and disadvantages of the three main approaches to research in the context of sport and exercise science.</p>	<p>C.M3 Compare quantitative, qualitative and mixed-methods research in the context of the sport and exercise sciences.</p>	
Learning aim D: Apply appropriate research methods to a selected sport and exercise sciences-based research problem		
<p>D.P7 Explain the appropriate research methods for a sport and exercise sciences-based research problem.</p> <p>D.P8 Explain the research skills used to address a selected sport and exercise sciences-based research problem.</p>	<p>D.M4 Analyse the research methods for a sport and exercise sciences-based research problem and the research skills used to address a selected research problem.</p>	

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of two summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aims: A and B (A.P1, A.P2, B.P3, B.P4, A.M1, B.M2, A.D1, B.D2)

Learning aims: C and D (C.P5, C.P6, D.P7, D.P8, C.M3, D.M4, CD.D3)

Further information for teachers and assessors

Resource requirements

For this unit, learners must have access to:

- appropriate equipment for recording data, such as voice recorders, tablets or laptop computers, and video or still cameras
- appropriate data analysis programmes for statistical analysis, such as Microsoft® Excel, SPSS®.

Essential information for assessment decisions

Learning aims A and B

For distinction standard, learners will demonstrate the importance of the relationship between the different types of research, the factors affecting the quality of research, ethics, and how these affect a sport and exercise scientist's ability to adopt evidence-based practice with clients. Evidence, such as relevant textbooks, websites or appropriate level peer-reviewed journals to support learners' suggestions is required for the award of this criterion. There will be a clear conclusion to learners' work. For example, only working in their own area of competence is important for the welfare and safety of the research participant, as well as for ensuring that collected data is valid, reliable, accurate and precise, which will then affect the conclusions and interpretations possible from the research.

For merit standard, learners will consider the interrelationships between the importance of different types of research in sport and exercise sciences, and the ability of a practitioner to use this research with clients in an evidence-based manner. This analysis will be evident throughout their work.

Learners will provide clear details of how validity, reliability, accuracy and precision are linked with research ethics in sport and exercise sciences. They will link the ethical issues highlighted within the British Association of Sport and Exercise Sciences (BASES) Code of Conduct with research quality considerations, for example only working within their own area of competence is important for the welfare and safety of the research participant, as well as for ensuring that collected data is valid, reliable, accurate and precise. This will then affect the conclusions and interpretations possible from the research. Learners will provide evidence to support their suggestions and draw clear conclusions.

For pass standard, learners will give a clear, accurate and objective account of research ethics and the importance of research ethics in sport and exercise sciences research. This will be achieved through the use of case-based activities whereby learners are provided with specific sport and exercise sciences-based scenarios and provide their own account of the ethical issues associated with each case.

Learners will accurately define validity, reliability, accuracy and precision in research and their importance in research settings. This will also include the different types of validity and reliability as outlined in the unit content, as well as the impact of accuracy and precision on validity and reliability.

Learners will provide evidence of searching for appropriate literature and using this to clarify the importance of research in sport and exercise sciences. This will involve the learners completing a mini literature review where they demonstrate how the literature they have found could be used to benefit the work of a sport and exercise scientist.

Learners will consider the definition of research, the extent to which they agree with this definition and how the definition informs their understanding of research as a concept. Following this, they will show that they understand the primary and secondary research, how they relate to the overall definition of research and why both are important in research and applied sport and exercise sciences contexts.

Learning aims C and D

For distinction standard, learners will explain why they chose the overall approach to a research problem (quantitative, qualitative or mixed), as well as the research design, data collection method(s) and data analysis method(s). This reasoning will be supported with evidence from an appropriate resource (for example, sport and exercises-based research methods textbook chapter or appropriate-level journal) and should be clearly linked to the advantages and/or disadvantages of the overall approaches, design and methods. Learners will also demonstrate proficient use of skills in complex or advanced situations – for example, showing that they are able to collect data in a laboratory-based setting then analyse the data integrating appropriate descriptive, inferential and practical meaningfulness statistics.

For merit standard, learners will clearly show the similarities and differences between the different approaches to research in the sport and exercise sciences. The frame of reference for the compare-and-contrast approach will be within the context of sport and exercise sciences, and there will be clear grounds for comparison to demonstrate that their work is deliberate and meaningful. They should produce a 'classic style' compare-and-contrast assessment giving each research approach equal weighting in order to demonstrate a bias-free approach to understanding research approaches in sport and exercise sciences.

For pass standard, learners will describe each of the three main approaches to research in sport and exercise sciences (quantitative, qualitative and mixed). Their description will be accurate enough to clearly disaggregate between the three different approaches and will include all of the information included next to the relevant research approach heading in the unit content.

Learners will clearly show the advantages and disadvantages of each of the different research approaches as outlined in the unit specification and using relevant sport and exercise sciences-based examples.

Learners will show clear details of the research design, data collection and data analysis methods for the selected research problem. These details will show what they did as part of the collection and analysis process, as well as how they did it. This will be clearly presented in the past tense; the first person should be avoided. Learners will also demonstrate skills in the use of more advanced research methods, for example they should show that they can accurately collect data from fitness tests and analyse the data using appropriate descriptive and inferential statistics.

Learners will explain the research skills used for their selected research problem. Evidence for this may include videos or annotated photographs of learners collecting data, and raw data sheets with analysis. Witness testimony forms alone cannot provide evidence for the achievement of the assessment criterion, but can be used as supplementary or supporting evidence.

Links to other units

This unit links to:

- Unit 4: Field and Laboratory-based Fitness Testing
- Unit 9: Research Project in Sport and Exercise Science.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit.

Unit 6: Coaching for Performance and Fitness

Level: **3**

Unit type: **Internal**

Guided learning hours: **90**

Unit in brief

Learners will develop the knowledge and ability to plan, deliver and evaluate coaching sessions that promote athletes' technical, tactical and fitness performance.

Unit introduction

National governing bodies (NGBs) in sport are pursuing international and other major competition success. There is, therefore, a demand for sports coaches who can develop the performance and competition fitness of athletes to produce elite performers.

In this unit, you will develop coaching skills, knowledge, qualities and best practices, allowing for sessions to incorporate progression over time. You will develop your planning, delivery and reflection skills, as well as your ability to use a variety of coaching practices. You will explore different practices and measures that could be used to develop sports performance. You will undertake the key vocational task of coaching a session to improve the performance of the athletes through enhancement of techniques, their application and the improvement of fitness. Finally, you will learn how to effectively evaluate the impact of your own coaching for the future development of athletes and of you as a coach. In this unit you will draw on your learning from across your programme to complete assessment tasks.

To be able to complete the assessment activity within this unit, you will select and apply knowledge and skills developed in your study of the mandatory content, and your wider learning from across the programme. Skills and knowledge used follow on from those developed in *Unit 2: Functional Anatomy* and *Unit 3: Applied Sport and Exercise Psychology*. Learners may also draw on application of research skills from *Unit 5: Applied Research Methods in Sport and Exercise Science*.

This combination of knowledge, understanding and skills will help to prepare you for a range of careers, such as sports coach or physical education teacher, or for higher education courses in the sport, fitness and active leisure sector.

Learning aims

In this unit you will:

- A** Investigate coaching for performance and fitness
- B** Explore practices, adaptations and measures used to develop performance and fitness
- C** Demonstrate effective planning of coaching to develop performance and fitness
- D** Explore the impact of coaching for performance and fitness.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Investigate coaching for performance and fitness	<p>A1 Skills and knowledge for coaching for performance and fitness</p> <p>A2 Qualities for coaching for performance and fitness</p> <p>A3 Best practice for a coach for performance and fitness</p> <p>A4 Methods of supporting the development of performance and fitness</p> <p>A5 Technology and sports professionals</p>	<p>A job description for a performance-coaching role that details skills, qualities and best practices of a performance coach.</p> <p>A report reflecting own current coaching performance against the job description.</p>
B Explore practices, adaptations and measures used to develop performance and fitness	<p>B1 Practices to develop skills and techniques for performance</p> <p>B2 Practices to develop tactics for performance</p> <p>B3 Adaptation of practices to promote development of performance and fitness</p> <p>B4 Measures of performance and fitness</p>	<p>Coaching resources that detail practices, benchmarks and field tests that will develop fitness, skills, techniques and tactics for performance.</p> <p>A report that assesses the practicality, suitability and effectiveness of the practices, suggesting adaptations.</p>
C Demonstrate effective planning of coaching to develop performance and fitness	<p>C1 Planning considerations</p> <p>C2 Planning for an individual session for performance and fitness</p> <p>C3 Planning for an overall series of sessions for performance and fitness</p>	<p>A coaching plan that details safe working coaching practices that will develop performance, reflected in a series of coaching sessions.</p> <p>A video of the delivered coaching session based on the coaching plan.</p>
D Explore the impact of coaching for performance and fitness	<p>D1 Delivering coaching for performance and fitness</p> <p>D2 Reflection on session and planned series</p> <p>D3 Coaching development based on reflection</p>	<p>A report reflecting on the planning, delivery and impact of own coaching performance.</p>

Content

Learning aim A: Investigate coaching for performance and fitness

A1 Skills and knowledge for coaching for performance and fitness

Learners should understand the skills required for performance and fitness coaching and their application to promote development:

- organisation
- rapport building
- communication: verbal, non-verbal
- diplomacy
- motivation
- knowledge of sports characteristics and demands: technical, tactical, fitness
- knowledge of correct technical and tactical performance models for selected sports
- knowledge of components of fitness for different sports
- knowledge of a range of sports activities to challenge and develop performance, e.g. rules, techniques, practices, adaptations for different conditions
- knowledge of a range of sports adaptations to challenge and develop performance and fitness: space, time, equipment, pace, people, intensity, duration
- planning for changing conditions, e.g. athletes, resources, weather, location, facilities
- planning for progression: technical, tactical, fitness
- maintaining safety in changing conditions, e.g. athletes, resources, weather, location, facilities.

A2 Qualities for coaching for performance and fitness

Learners should understand the qualities required for performance and fitness coaching.

- Professionalism:
 - time keeping
 - a positive attitude
 - positive role modelling
 - knowledge
 - proactivity
 - problem solving abilities
 - adaptability
 - empathy
 - approachability
 - personal prep/appearance
 - enthusiasm
 - positivity
 - appropriate levels of confidence
 - reflective skills
 - ability to be analytical and observant
 - ability to be responsive and reactive
 - awareness of individual athlete's ability
 - experience and fitness.

A3 Best practice for a coach for performance and fitness

- Safeguarding.
- Disclosure and Barring Service (DBS).
- Equal opportunities.
- Qualifications and continuing professional development (CPD):
 - National Governing Bodies (NGBs)
 - academic.

- Risk assessment of environment and activity.
- Emergency procedures.
- Administration for coaching: register, record keeping, planning and preparation (sessions, series of sessions), insurance, Physical Activity Readiness Questionnaire (PAR-Q), consent to coach.

A4 Methods of supporting the development of performance and fitness

- Feedback:
 - to groups
 - to individuals
 - on performance: technical, tactical, fitness, effort, intensity
 - hot and cold feedback: during performance, straight after, after reflection.
- Goal setting and SMART (specific, measurable, achievable, realistic, time-bound) targets for individuals and teams:
 - primary and secondary goals
 - process goals
 - outcome/competition goals
 - during the session/training
 - short-/long-term
 - for the season
 - for future development.

A5 Technology and sports professionals

Learners should understand technologies and sports professionals available to fitness and performance coaches to promote development of the technical, tactical and fitness performance of athletes.

- Supporting technologies:
 - video analysis software, e.g. Coach's Eye, Dartfish®, Kandle
 - electronic training logs, e.g. TrainingPeaks®, Strava™, Runkeeper
 - heart-rate monitors
 - Global Positioning System (GPS) tracking
 - power meters
 - laboratory-based testing, e.g. VO₂ max tests, lactate threshold testing
 - online resources, e.g. specialist websites, forums, video sharing sites and social media.
- The effectiveness, cost, practicality, usability and relevance of technologies for coach and athlete.
- Supporting professionals:
 - sports nutritionist
 - sports masseur
 - physiotherapist
 - chiropractor
 - osteopath
 - sports psychologist
 - strength and conditioning coach.
- The effectiveness, cost, practicality, usability and relevance for coaches and athletes.

Learning aim B: Explore practices, adaptations and measures used to develop performance and fitness

Learners can research the characteristics and demands of their chosen sport, as well as practices and adaptations to promote performance and fitness.

B1 Practices to develop skills and techniques for performance

- Isolated practices.
- Conditioned situations.
- Competitive situations: offensive, defensive.
- Evaluation of practices: practicality, suitability, effectiveness, relevance.

B2 Practices to develop tactics for performance

- Conditioned situations.
- Competitive situations.
- Evaluation of practices: practicality, suitability, effectiveness, relevance.

B3 Adaptation of practices to promote development of performance and fitness

Learners should understand how to adapt practices to replicate the demands of the sport in order to develop performance and competition fitness.

- The participants:
 - size of group
 - role of individuals in practices
 - technique restrictions
 - individual progressions.
- The environment: space, smaller/larger or conditioned/restricted playing areas.
- Equipment:
 - minimal, no equipment
 - use of equipment for different purposes/games.
- Physical fitness demands:
 - intensity
 - duration/distance.
- Psychological demands:
 - introduction of competition pressures, e.g. races, games
 - measured performance, e.g. timed, distance, accuracy
 - advantaging/disadvantaging athlete performance, e.g. head start in a race/game.
- Evaluation of adaptations: practicality, suitability, effectiveness, relevance.

B4 Measures of performance and fitness

Learners should understand measurements of fitness and performance when developing athletes.

- Benchmarks:
 - observation of higher levels of performance, age group, senior or elite
 - national/regional/school/club records
 - class or group measures
 - beginning, during and end of training period.
- Field tests:
 - technical, e.g. accuracy, distance
 - tactical, e.g. notational analysis
 - fitness, e.g. speed, distance, time
 - coach devised, e.g. shot tally, observation analysis
 - standard tests, e.g. Cooper run test, multi-stage fitness test, Illinois agility run test.
- Evaluation of measures: practicality, suitability, effectiveness, relevance.

Learning aim C: Demonstrate effective planning of coaching to develop performance and fitness

Learners will understand how to produce effective coaching plans that will be used to improve the physical performance of an individual.

C1 Planning considerations

- Information considered prior to planning sessions and series of sessions to develop performance:
 - understanding of athletes and group: number, age, ability/level of performance/level of fitness, individual needs/aims/targets
 - knowledge of environment: community hall/small indoor space, outdoor grassed area, tarmac area, sports hall/large indoor space, public space, private space, shared space
 - knowledge of equipment: minimal, no equipment, use of equipment for different purposes, games to challenge performance
 - selection of skills and techniques for development, knowledge of correct technical models
 - selection of suitable intensities and durations of practices to replicate the demands of the sport
 - setting of clear learning aims and outcomes to develop performance
 - selection of practices to develop performance and fitness and relevant adaptations to challenge/develop individuals
 - differentiation through adaptation of activity
 - consideration of benchmarks and field testing
 - contingency plans.
- Health and safety considerations:
 - athletes and group
 - environment
 - equipment.

C2 Planning for an individual session for performance and fitness

Could include relevant elements, such as:

- introduction aim/target setting
- equipment and facilities
- warm-up linked to practices
- technique/tactic introduction
- performance analysis and feedback to athletes
- technique/tactic development
- technique/tactic advancement: complexity, difficulty, combination
- conditioned situations
- competitive situations
- adaptations for performance
- cool-down and plenary coach/athlete feedback, reflection on progression towards session aims/targets
- information about the intensity and duration of each practice
- considerations of benchmarks and field testing.

C3 Planning for an overall series of sessions for performance and fitness

Planning for a series of sessions, focusing on progression of complexity and refinement of technical and tactical components, and the development of the athletes' fitness.

- Overall aim/target for the series.
- Amount of sessions in series (a minimum of four).
- Schedule of benchmarking and field tests to measure progression.
- Linking sessions to progress and develop during series, which could include:
 - development of different skills and techniques combined to create an end-product performance
 - development of a selected technique
 - development of a tactical application
 - development of relevant fitness components for sport performance.
- Culmination/end product of a series of sessions, which could include:
 - competition, non-competitive
 - repetition of field tests.

Learning aim D: Explore the impact of coaching for performance and fitness

Learners will deliver a planned coaching session and reflect on their success and development needs for the future.

D1 Delivering coaching for performance and fitness

- Learners are required to coach a performance and fitness session for a sport that could demonstrate:
 - skills of a coach
 - knowledge of a coach
 - qualities of a coach
 - best practice of a coach
 - adaptation of session structure
 - performance analysis
 - relevant feedback to athletes.

D2 Reflection on session and planned series

- Reflection on individual session covering:
 - impact of planning considerations on athletes' development towards performance and fitness
 - impact of practices and/or measures on athletes' development towards performance and fitness
 - impact of coaching delivery on athletes' development towards performance and fitness
 - progress towards coaching aims/targets
 - adaptations to planned series sessions
 - health and safety.

D3 Coaching development based on reflection

- Personal development recommendations based on reflection on session:
 - skills and knowledge for coaching activities for performance and fitness
 - qualities for coaching activities for performance and fitness
 - best practice for a coach for performance and fitness.
- Individual session development recommendations based on reflection on session:
 - effectiveness of practices and measures
 - appropriateness of practices and measures
 - manageability of practices and measures
 - adaptation of planned series sessions.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Investigate coaching for performance and fitness		A.D1 Analyse coaching for performance and fitness, and the use of technology and supporting professionals to support athlete development.
<p>A.P1 Describe coaching for performance and fitness and the methods used to support athlete development.</p> <p>A.P2 Describe the role technology and professionals may have to support athlete development when coaching for performance and fitness.</p>	<p>A.M1 Explain coaching for performance and fitness, the methods used to support athletes and the role technology may play in athlete development.</p>	
Learning aim B: Explore practices, adaptations and measures used to develop performance and fitness		B.D2 Evaluate the practicality, suitability and effectiveness of practices and measures used to develop athletes when coaching for performance and fitness.
<p>B.P3 Explain practices and adaptations used to develop athletes when coaching for performance and fitness.</p> <p>B.P4 Explain measures used to develop athletes when coaching for performance and fitness.</p>	<p>B.M2 Analyse practices and adaptations used to develop athletes when coaching for performance and fitness.</p> <p>B.M3 Analyse measures used to develop athletes when coaching for performance and fitness.</p>	
Learning aim C: Demonstrate effective planning of coaching to develop performance and fitness		CD.D3 Evaluate the impact of the planning and delivery of the performance and fitness session, justifying adaptations to future sessions and personal coaching developments.
<p>C.P5 Produce a detailed plan for an individual performance and fitness coaching session that reflects planning considerations and measures, and fits within an overall series plan.</p>	<p>C.M4 Discuss the interrelationship between own individual plan, planning considerations, measures and the overall series plan.</p>	
Learning aim D: Explore the impact of coaching for performance and fitness		
<p>D.P6 Deliver the individual performance and fitness session, showing consideration of health and safety factors.</p> <p>D.P7 Review the delivered performance and fitness session, reflecting on own planning and coaching performance.</p>	<p>D.M5 Analyse the impact of the planning and delivery of the performance and fitness coaching session, suggesting adaptations to future session and personal coaching developments.</p>	

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of three summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim: A (A.P1, A.P2, A.M1, A.D1)

Learning aim: B (B.P3, B.P4, B.M2, B.M3, B.D2)

Learning aims: C and D (C.P5, D.P6, D.P7, C.M4, D.M5, CD.D3)

Further information for teachers and assessors

Resource requirements

For this unit, learners must have access to:

- coaching equipment, such as whistle, watch, clipboard
- recording equipment, such as video camera, tablet, voice recorder.

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will complete an analysis of the skills, knowledge, qualities and best practice required to deliver coaching for performance and fitness. They will also analyse the use of technology and supporting professionals to support athlete development. Learners will include practical examples to support the analysis, and these can be drawn from coaching activities or relevant life experiences. Within their analysis, learners will identify clear reasons for the inclusion of each element and how they sit within coaching for performance and fitness sessions.

For merit standard, learners will explain the skills, knowledge, qualities and best practice required to deliver coaching for performance and fitness, and selected methods used to help support developing athletes. They will also detail the role technology may play in supporting athlete development, giving examples to support their points. They will complete this explanation by breaking down coaching situations and the requirements of a performance coach to study and make judgements on the impact of the methods and technology.

For pass standard, learners will discuss the skills, knowledge, qualities and best practice required by a performance and fitness coach, detailing the methods and technology they may use to support the development of athletes. Examples of coaching and fitness sessions could be used to illustrate and support discussion points.

Learning aim B

For distinction standard, learners will evaluate the practicality, suitability, effectiveness and relevance of the practices and measures, making judgements on the advantages and disadvantages of each. They will then make recommendations, derived from the advantages and disadvantages, for adaptations to meet the differing performance and fitness needs of individual athletes or teams. Learners will justify the relevance or significance of each adaptation in relation to coaching for performance and fitness.

For merit standard, learners will analyse coaching practices and the practicality, suitability and effectiveness of each. Learners will also detail how each practice is designed to develop/promote an individual athlete or team's skills, as well as their technical and tactical performance. They will support their analysis with examples of the practicality, suitability and effectiveness of each practice. They will also analyse measurements used to develop athletes and give examples to support their points.

For pass standard, learners will explain coaching practices that develop an individual athlete or team's skills, as well as their technical and tactical performance. They will breakdown each of the practices, giving clear details to show that they understand the functions and objectives of each. Learners will also explain the different types of measurements coaches may use to help track and monitor performance, giving examples of how they may support an athlete's development.

Learning aims C and D

In achieving learning aim C and D, learners must prepare a plan for the management of a coached session to improve performance and fitness, engage in planned activities and evaluate the effectiveness of the activity.

In completing the assessment tasks for these learning aims, learners will independently select, apply and demonstrate appropriate knowledge and skills from other units, such as:

- *Unit 2: Functional Anatomy*: structure, characteristics and function of the anatomical systems in the context of their effectiveness in producing sport and exercise movements; anatomical systems and how they interrelate in order to carry out different exercise and sporting movements.
- *Unit 3: Applied Sport and Exercise Psychology*: psychological factors, concepts, interventions and theories in sport and exercise activities and the introduction of competition pressures.
- *Unit 5: Applied Research Methods in Sport and Exercise Science*: the effective application of research skills including validity, ethical issues, and quantitative and qualitative data analysis.

For distinction standard, learners will evaluate the impact of their planning and coaching for performance and fitness on the athlete and/or team. The evaluation will detail strengths and weaknesses and how each one has contributed towards athlete and/or team performance and fitness during and after the session. During the evaluation, it is essential that learners reflect on the session delivered and their own coaching performance, as well as the impact on their own performance. They will draw on valid information from the planning and delivery of sessions to support their conclusions. Learners will use the knowledge gained from *Unit 2: Functional Anatomy*, and *Unit 5: Applied Research Methods in Sport and Exercise Science* to effectively evaluate coaching and its impact on fitness when planning and delivering sessions.

Learners will justify how they could develop their planning and personal coaching abilities for future coaching sessions, suggesting actions to achieve these goals (for example, coaching courses). Knowledge gained from *Unit 3: Applied Sport and Exercise Psychology* will support learners in planning sessions using goal-setting techniques. Learners are required to justify the relevance or significance of each action to their personal development as a performance coach.

For merit standard, learners will discuss the interrelationship between their individual plan, planning consideration and an overall series plan. The discussion will consider how each element may contribute to development in performance and how they interact with each other in a holistic approach to athlete and/or team progression. Learners will analyse their delivered coaching session by breaking down the session plan and their coaching performance to interpret and study the interrelationship between them and the impact of each one. Learners will be able to draw upon their knowledge of *Unit 5: Applied Research Methods in Sport and Exercise Science* to use appropriate approaches and methods to interpret the breakdown of their coaching performance.

On completion of the planning and delivery phase, learners will complete an analysis of their coaching performance. This analysis will include reflection on the impact that their personal performance as a coach and the series and session plans has had on the performance of the athletes, and how the session and its outcomes relate to the planning and whole session series. To aid analysis, learners should make a recording of the session.

For pass standard, learners will produce a detailed session plan that includes relevant practices targeting improvement in performance through the development of skills, techniques and tactics for either an individual athlete or a team. Learners will reflect on key planning considerations and how the session fits into an overall plan for a series of progressive sessions aimed at developing performance. This can be evidenced through the production of an overall series plan (for example, a scheme of work), previous/future session plans or written evidence of previous learning and planned future progressions. Learners will safely and independently deliver the planned session. Evidence of delivery can be through a video recording of the session, which can also support their review process. By selecting appropriate knowledge from *Unit 5: Applied Research Methods in Sport and Exercise Science* learners will be able to provide evidence using suitable methods to assess performance.

Learners will complete a review of their delivered coaching session, making an assessment of their planning and coaching performance. The review will include evidence of learners reflecting on their personal performance as a coach and their planning for the session. By selecting appropriate knowledge from *Unit 3: Applied Sport and Exercise Psychology* learners will be able to provide evidence for a review of their own individual coaching performance. Evidence of delivery and review can be through written documents or a video recording of the session/review.

Links to other units

This unit brings together the skills, knowledge and understanding from other units studied across the qualification.

Employer involvement

Centres can involve employers in the delivery of this unit if there are local opportunities to do so. There is no specific guidance related to this unit.

Unit 7: Biomechanics in Sport and Exercise Science

Level: **3**

Unit type: **Internal**

Guided learning hours: **60**

Unit in brief

This unit examines human movement, the movement of sporting objects, forces that the human body produces and forces that act on it in sport and exercise environments.

Unit introduction

An understanding of biomechanics is essential for coaches who need to analyse the forces in action in a sport or exercise activity, and how they impact on performers and affect their performance. You will be able to answer questions such as, 'Why do tennis balls and cricket balls spin?', 'What is the optimal angle to release a javelin?' and 'What clothing and footwear are most appropriate to prevent injury?'. Biomechanics is one of the central subjects in sport science because all sport and exercise activities involve movement. Biomechanics seeks to describe and analyse human movement and to apply scientific principles in order to improve sporting performance.

In this unit, you will gain an understanding of the types of motion that the human body undertakes in sport and the forces that impact on the human body, such as reaction forces, friction and buoyancy. You will examine concepts that explain what happens when the body or sporting objects move through air – for example, principles of aerodynamics, drag and lift – and the key role that centre of mass plays in maintaining the stability of the body. The application of this knowledge to practical situations is particularly important, as it will enable you to become a more effective coach, instructor or sports performer.

This combination of knowledge, understanding and skills will help to prepare you for higher education courses in the sport and exercise science sector, and for supporting individual athletes or teams.

Learning aims

In this unit you will:

- A** Investigate linear motion in sport and exercise activities
- B** Examine forces acting on sports performers and their equipment
- C** Investigate angular motion in sport and exercise activities.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Investigate linear motion in sport and exercise activities	A1 Linear motion A2 Speed and velocity A3 Acceleration and deceleration A4 Inertia and momentum	A portfolio that details an investigation into linear motion in sport and exercise science.
B Examine forces acting on sports performers and their equipment	B1 Newton's three laws of motion B2 Reaction forces B3 Friction B4 Air resistance B5 Aerodynamics B6 Lift and Bernoulli's principle	A report that examines the forces acting on sports performers and their equipment.
C Investigate angular motion in sport and exercise activities	C1 Centre of mass C2 Centre of mass and stability C3 Levers C4 Axes of rotation	A presentation that details an investigation into angular motion in sport and exercise activities.

Content

Learning aim A: Investigate linear motion in sport and exercise activities

A1 Linear motion

Understand types of linear motion and how they explain movement in sports activities.

- Linear motion:
 - movement of a body or object in a straight line
 - rectilinear and curvilinear motion.
- Vector and scalar quantities:
 - vector quantities are described in terms of size and direction
 - scalar quantities are described only in terms of size.
- Vector and scalar quantities may include:
 - mass describes the amount of matter a body possesses in kg and is a scalar quantity
 - weight is the effect gravity has on the mass of a body in N and is a vector quantity.

A2 Speed and velocity

Understand the difference between the speed and velocity of sports bodies and objects, and how to calculate them using sporting examples.

- Distance and displacement:
 - distance describes how far a body or object has moved
 - displacement considers how far a body or object has moved in relation to its starting position.
- Speed:
 - a scalar quantity measured in metres/second (m/s)
 - considers the distance a body or object has travelled
 - calculated by dividing distance covered in metres by the time taken in seconds
 - calculate speed in sporting situations, e.g. average speed of a sprinter or speed during each 10 m segment of a 100 m race.
- Velocity:
 - a vector quantity measured in metres/second (m/s)
 - considers the displacement of a body or object
 - calculated by dividing displacement in metres by the time taken in seconds
 - calculate velocity in sporting situations, e.g. compare velocity of a sprinter over distances of 100 m and 400 m.

A3 Acceleration and deceleration

Understand acceleration and deceleration and how to calculate these using sporting examples.

- Definition: a measure of how quickly velocity changes over a set period of time.
- Calculating acceleration and deceleration:
 - velocity at the end of the time period minus velocity at the start of the time period divided by the length of the time period
 - acceleration and deceleration are measured in metres/second (m/s)
 - acceleration will be a positive figure and deceleration a negative figure
 - calculate acceleration and deceleration in practical situations.

A4 Inertia and momentum

Understand inertia and momentum and how to calculate momentum using sporting examples.

- Definitions and description:
 - inertia is the tendency of a body to resist a change in its state of motion
 - the greater the mass of an object the greater its inertia
 - momentum is the quantity of motion that a body or object possesses
 - momentum is a vector quantity that is the product of its mass and velocity.

- Calculation of momentum:
 - momentum is calculated by multiplying a body's mass (kg) by its velocity (m/s)
 - momentum is measured in kg m/s
 - calculate momentum in practical situations, e.g. moving objects, moving bodies.

Learning aim B: Examine forces acting on sports performers and their equipment

B1 Newton's three laws of motion

Understand Newton's three laws of motion and their application to sport and exercise.

- Newton's first law of motion – law of inertia: a body will maintain a state of rest or constant velocity unless acted on by an external force that changes its state.
- Newton's second law of motion – law of acceleration: a force applied to a body causes acceleration of that body of a size proportional to the force, in the direction of the force and inversely proportional to the body's mass.
- Newton's third law of motion – law of reaction: when one body exerts a force on a second body, the second body exerts a reaction force equal in magnitude and opposite in direction on the first body.
- Application of Newton's three laws to sport and exercise situations:
 - applying forces to stationary sporting objects
 - striking balls and other sporting objects
 - collisions in sport between bodies and objects.

B2 Reaction forces

Understand forces and how they impact on sport and exercise activities.

- Force:
 - a push or pull exerted on a body that will tend to change its state of motion
 - measured in Newtons (N).
- Ground reaction force:
 - its magnitude is dependent on the mass of the body and the gravity acting on this mass
 - ground reaction force is equivalent to the force exerted downwards by the body
 - effect of the changes in reaction forces in sporting situations.
- Action and reaction forces:
 - examples of action and reaction forces in sports, e.g. kicking and throwing objects, pushing off the ground.
- Impact on sport and exercise activities:
 - production of forces to move the body and sporting objects.

B3 Friction

Understand friction and its implications for performance in sport and exercise activities.

- Definition: a force acting when two surfaces come into contact with each other.
- Types of friction: static, rolling and sliding friction.
- Coefficient of friction:
 - a unit-less number representing the relative ease of sliding between two surfaces
 - factors affecting the coefficient of friction (relative hardness and roughness of surfaces).
- Implications of frictional forces for sports performance:
 - design of sports clothing to minimise friction
 - friction between tyres and the road surface.

B4 Air resistance

Understand air resistance and its effect on sport and exercise activities.

- Definition:
 - the force that acts on a body moving through air in the opposite direction to its direction of travel

- caused by the molecules that make up air making contact with the surface of the moving body
- also referred to as drag.
- Effect of air resistance on projectiles:
 - parabolic, nearly parabolic and asymmetric flight paths
 - forces acting on a projectile during flight (weight and air resistance).
- Implications and effect of air resistance for the design of sports equipment and clothing:
 - streamlining
 - examples from cycling, running and swimming.

B5 Aerodynamics

Understand aerodynamics and its implications for performance in sport and exercise activities.

- Definition: how air flows around an object.
- Factors affecting speed of flow around an object:
 - speed of movement
 - shape of object
 - nature of the object's surface.
- Types of flow:
 - laminar flow (air flows in parallel lines around an object)
 - turbulent flow (air flows in a violent, mixed-up way)
 - impact of turbulence on moving bodies and objects.
- Implications of turbulence for sports performance:
 - drafting in cycling, running and motor racing
 - design of cricket and golf balls.

B6 Lift and Bernoulli's principle

Understand lift and how it impacts on sports activities.

- Definition:
 - an upward force that is caused by air flowing at different speeds above and below an object
 - also referred to as Bernoulli's principle.
- Factors affecting lift:
 - shape of the object
 - angle at which it is positioned.
- Magnus effect:
 - application of Bernoulli's principle to spinning objects
 - contact between air molecules at the boundary layer and the air flow
 - creates a pressure differential and a Magnus force causing an object to deviate from its course.
- Bernoulli's principle and impact on sports performance:
 - effect on flight of projectiles (discus, shot)
 - optimum angle of take-off for ski jumpers and long jumpers
 - design of aeroplane wings and aerofoil in Formula 1 racing
 - applying spin to tennis and cricket balls
 - applying spin to a football to enable it to move in the air.

Learning aim C: Investigate angular motion in sport and exercise activities

C1 Centre of mass

- Definition:
 - the point through which gravity acts on an object
 - the point where there is an equal weight force on both sides
 - also referred to as centre of gravity.

- Location of the centre of mass:
 - symmetrical shapes (e.g. balls)
 - asymmetrical shapes (e.g. human body)
 - movement of the centre of mass in response to the movement of the human body.
- Impact of location of centre of mass on sports performance:
 - manipulation of centre of mass during jumping events
 - changes in position of centre of mass to maintain balance in sport.

C2 Centre of mass and stability

Understand the relationship between centre of mass and stability and its application in sport and exercise activities.

- Relationship between centre of mass and stability: stability is dependent on the location of the centre of mass.
- Factors affecting the centre of mass of a human body:
 - height
 - weight
 - position of limbs in relation to the body
 - width of base of support
 - posture.
- Manipulation of centre of mass to improve sports performance:
 - techniques in high jumping and gymnastics
 - foot placement in running/sprinting
 - stance in boxing and martial arts.

C3 Levers

Understand different types of levers and apply them to sport and exercise examples.

- Functions of levers:
 - increase the resistance that any given effort can move
 - increase the speed the body moves at
 - increased mechanical advantage.
- Types of levers:
 - first class
 - second class
 - third class
 - dependent on the relationship between fulcrum, effort and load.
- Turning effects:
 - moment of force/torque
 - calculated by magnitude of the force multiplied by length of moment arm.

C4 Axes of rotation

- Description of axes: axes of rotation describe the axes around which the body can rotate.
- Principle axes:
 - longitudinal (runs through the body from the top to the bottom)
 - mediolateral (runs through the body from side-to-side)
 - anteroposterior (runs through the body from the front to the back).
- Movement in each axis of rotation:
 - longitudinal – ice skater spinning
 - mediolateral – diver performing a front somersault
 - anteroposterior – gymnast performing a cartwheel.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Investigate linear motion in sport and exercise activities		A.D1 Analyse speed, velocity, acceleration, deceleration and momentum using relevant calculations from sport and fitness contexts.
A.P1 Describe speed, velocity, acceleration, deceleration and momentum in sport and exercise contexts.	A.M1 Explain speed, velocity, acceleration, deceleration and momentum in sport and exercise contexts.	
Learning aim B: Examine forces acting on sports performers and their equipment		B.D2 Analyse, using examples, how forces impact on sport and exercise performance.
B.P2 Describe how forces impact on sport and exercise performance referencing Newton's three laws of motion.	B.M2 Explain how forces impact on sport and exercise performance referencing Newton's three laws of motion.	
Learning aim C: Investigate angular motion in sport and exercise activities		C.D3 Analyse how different types of levers and changes in the centre of mass combine to affect performance in sport and exercise activities.
C.P3 Describe how different types of levers and axes of rotation are used in sport and exercise activities.	C.M3 Explain how different types of levers and axes of rotation are used to complete different movements.	
C.P4 Describe how changes in the centre of mass affect performance in sport and exercise activities.	C.M4 Explain how changes in the centre of mass affect performance in sport and exercise activities.	

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of three summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim: A (A.P1, A.M1, A.D1)

Learning aim: B (B.P2, B.M2, B.D2)

Learning aim: C (C.P3, C.P4, C.M3, C.M4, C.D3)

Further information for teachers and assessors

Resource requirements

There are no specific additional requirements for this unit.

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will analyse speed, velocity, acceleration and deceleration in detail. They will breakdown motion in sport and exercise activities into their component parts, showing changes in each type of linear motion. Learners should be able to calculate each type of linear motion and show the relationships between the different types. Both activities will be analysed in detail, demonstrating a clear understanding of the principles of linear motion as applied to sport and fitness activities.

For merit standard, learners will provide explanations of each type of linear motion. They will use practical examples to identify where each type of linear motion is occurring and offer an associated explanation for each example. They will show that they understand the functions and objectives of motion, and clearly differentiate between the different types of linear motion as well as making connections between them.

For pass standard, learners will give an account of each of the types of linear motion and provide basic information about how they apply to their selected sport and fitness activities. Learners should give specific examples of the types of linear motion present in their selected sport and exercise activities and differentiate accurately between each type. There may be an imbalance between the amounts of detail provided on each activity, where one has been dealt with in more detail than the other.

Learning aim B

For distinction standard, learners will analyse in detail how reaction forces, friction forces, air resistance and aerodynamics impact on sports performers and sports equipment by breaking down sport and exercise activities to show exactly how the forces are acting. They will examine how the negative and positive impact of forces can be manipulated to promote optimal sports performance and make connections between the impact of forces and the design of sports clothing and equipment. Both activities will be analysed in detail, demonstrating a clear understanding of the action and impact of forces as applied to sport and fitness activities, and the interrelationships between the different forces.

For merit standard, learners will show that they understand Newton's three laws of motion by identifying examples of where each law is in action and providing an expansion of how each law is being applied. They will provide explanations of how each force acts on sport and exercise performers and their equipment. They will use practical examples to identify where each force is acting and offer an associated explanation for each example. They will clearly differentiate between different forces and make connections between them.

For pass standard, learners will use sport and exercise examples to show how Newton's three laws of motion can be seen to be acting on either the motion of sports performers or their equipment. They will give an account of the different forces that act on sports performers and their equipment, and provide basic information about how they apply to their selected sport and fitness activities. There may be an imbalance between the amounts of detail provided on each of the forces covered and their chosen sport and exercise activities, where one has been dealt with in more detail than the other.

Learning aim C

For distinction standard, learners will analyse in detail the impact of changes in the centre of mass and breakdown sport and exercise activities into their component parts, showing how the centre of mass of a body is affected by changes in its shape and position. They will analyse the relationship between the position and movement of different types of levers on the location of the centre of mass and the stability of the body. They will analyse the selected activity in detail, demonstrating a clear understanding of the principles of centre of mass and different types of levers as applied to sport and fitness activities.

For merit standard, learners will provide explanations of each of the types of lever and axes of rotation. They will use practical examples to identify where different types of levers are producing movement, and where there is movement in each of the axes of rotation, and offer an associated explanation for each example. They will identify examples where changes in the centre of mass affect performance and offer an associated explanation of the impact of this change in position.

For pass standard, learners will give an account of each of the types of lever and axes of rotation, and provide basic information about how they apply to their selected sport and fitness activity. They will give examples of specific movements produced by each type of lever present in their selected sport and exercise activity, and differentiate accurately between the different types. Learners will provide examples of movement of the body through each of the axes of rotation in their selected sport and exercise activity, and differentiate accurately between movements in each axis. They will give an account of the location of the centre of mass of sporting objects, and how the centre of mass of the human body changes as its position changes.

Links to other units

This unit links to:

- Unit 1: Sport and Exercise Physiology
- Unit 2: Functional Anatomy
- Unit 5: Applied Research Methods in Sport and Exercise Science
- Unit 6: Coaching for Performance and Fitness
- Unit 9: Research Project in Sport and Exercise Science
- Unit 11: Sports Massage
- Unit 14: Technology in Sport and Exercise Science
- Unit 15: Sports Injury and Assessment.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit.

Unit 8: Specialised Fitness Training

Level: **3**

Unit type: **Internal**

Guided learning hours: **60**

Unit in brief

Learners study specialised fitness training and the physical demands of sports to plan training of periodised programmes and training sessions to improve sports performance.

Unit introduction

The fitness training industry is booming with both sporting and non-sporting people going to gyms and engaging with trainers or fitness coaches. Sports coaches and athletes are always striving for the marginal gains that will lead to improved performance and success. Specialised fitness training provides the tools and framework to identify the key performance factors and target fitness training programmes for an athlete's improvement.

You will explore the fitness requirements, physical characteristics and demands of sports that contribute to effective training and sports performance. You will then investigate methods of training for physical and skill-related fitness that will improve this performance. You will then examine the principles that underpin the design of periodised training programmes and training sessions. Finally, you will carry out the planning of programmes and training sessions for a chosen sport.

This unit will prepare you for progression to higher education or a career in sport coaching or the fitness industry, by developing your skills of interpretation and presentation of information, as well as the analysis and understanding of sports training and performance.

Learning aims

In this unit you will:

- A** Examine the fitness requirements, physical characteristics and demands of sport that contribute to effective training and performance
- B** Investigate methods of training for physical and skill-related fitness
- C** Explore the planning of fitness programming.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Examine the fitness requirements, physical characteristics and demands of sport that contribute to effective training and performance	A1 Characteristics of sport A2 Fitness demands of sports A3 Movement patterns A4 Energy systems and expenditure A5 Importance and influence on training programme design	A report that evaluates how the planning of an athlete's training is influenced by the fitness demands, characteristics and movement patterns of the sport they perform.
B Investigate methods of training for physical and skill-related fitness	B1 Training for physical fitness B2 Training for skill-related fitness B3 Effectiveness and suitability of training methods for athletes' goals	A report that evaluates the effectiveness of methods of training used to improve physical and skill-related fitness, justifying their contribution to improving performance in a chosen sport.
C Explore the planning of fitness programming	C1 Collecting personal information to aid programme design C2 Principles of training and their application to training programming C3 Designing periodised training programmes C4 Planning training sessions C5 Evaluating the effectiveness of programming and training plan design	A report that evaluates the effectiveness of a training programme and associated training plan, supported by the production of a periodised training programme and a training plan for a selected aspect of the periodised training programme.

Content

Learning aim A: Examine the fitness requirements, physical characteristics and demands of sport that contribute to effective training and performance

Learners must understand how the fitness demands and physical characteristics of a sport can affect the design of training programmes.

A1 Characteristics of sport

- Characteristics of single performance:
 - duration, e.g. short, long, sustained; seconds, minutes, hours, days
 - extent and influence of contact/impact, e.g. rugby, judo, boxing
 - recovery periods, during or in between performances.
- Types of activity, for example:
 - multi-sprint activity, e.g. football, rugby, netball or hockey
 - skills-based activities
 - multi-discipline, e.g. decathlon, modern pentathlon, triathlon
 - fitness-based (endurance, strength, power), e.g. marathon running, open-water swimming, weight lifting.
- Characteristics of athletes' performance cycle:
 - types of competition, e.g. tournaments, one-off performances, leagues
 - repetition and frequency of performance, e.g. heats, fixtures.

A2 Fitness demands of sports

- Cardiovascular endurance.
- Strength (isometric, isotonic).
- Localised muscular endurance.
- Explosive power.
- Speed.
- Agility.
- Balance and proprioception.
- Sustained anaerobic exercise (anaerobic power, speed endurance).
- Flexibility.
- Reaction time.

A3 Movement patterns

Learners must understand the different movement patterns and role of body parts as relevant to their chosen sport.

- Interaction of body parts:
 - arms/upper body – relationship to the core, reach, range of movement, bilateral or one sided
 - legs/lower body – relationship to the core, reach, range of movement, bilateral or one sided
 - core – base, centre of all movement, posture, dynamic during performance, static during performance, core's effect on balance.
- Movement patterns as relevant to the sport:
 - sustained repeated movements, e.g. running, jogging, walking
 - changes of direction
 - pre-programmed movements
 - reactive movements.

A4 Energy systems and expenditure

- Aerobic or anaerobic energy production.
- Energy expenditure.

A5 Importance and influence on training programme design

Influence of factors on fitness training programme design, including:

- time
- injury prevention
- performance outcomes
- pre-season/post-season
- manager requirements, e.g. to fulfil a role in a team
- personal/team/position goals, e.g. strength in scrum.

Learning aim B: Investigate methods of training for physical and skill-related fitness

Learners must understand the different methods for physical fitness training and skill-related fitness training and how methods are used in a programme to enhance performance.

B1 Training for physical fitness

- Flexibility:
 - definition of flexibility
 - functions of flexibility, e.g. prevention of injury, aesthetics, production of power
 - methods of training flexibility – static flexibility training (active and passive), ballistic, proprioceptive neuromuscular facilitation (the hold-relax technique, the hold-relax-contract technique, the hold-relax-swing technique)
 - effectiveness of training methods used to improve flexibility.
- Strength:
 - definitions of strength (maximum strength, core stability, strength endurance/muscular endurance)
 - functions of strength, e.g. posture, joint integrity, stability, force production
 - methods of strength training – traditional (repeated bouts of repetitions against resistance with adequate rest on stable surfaces), core stability (repeated bouts of repetitions with adequate rest on unstable surfaces), circuit training, complex training
 - types of strength exercise (compound exercises, isolated exercises)
 - strength and conditioning equipment, e.g. free weights, fixed resistance machines, gravity-based machines, elastic resistance, calisthenics, body weight, plyometric, rowing machines, turbo trainers
 - effectiveness of training methods used to improve strength.
- Cardiovascular endurance:
 - definitions of cardiovascular endurance (aerobic endurance, anaerobic endurance)
 - functions of cardiovascular endurance, e.g. stamina, sustained performance, speed of recovery, intensity of training
 - methods of training for cardiovascular endurance (continuous training, interval training, Fartlek training).

B2 Training for skill-related fitness

- Agility:
 - definition of agility
 - function of agility, e.g. change of direction, losing an opponent, creating space
 - methods of agility training (Speed, Agility and Quickness (SAQ®) training, agility ladders, shuttle runs).
- Speed:
 - definitions of speed (acceleration, ability to cover given distance, ability to move limbs quickly)
 - functions of speed, e.g. change of pace, cadence, acceleration
 - methods of speed training (acceleration sprints, hill sprints, overspeed training).

- Balance and proprioception:
 - definitions of balance and proprioception
 - function of balance and proprioception, e.g. limitation of agility and co-ordination, limitation of power, aesthetics
 - methods of balance and proprioception training (wobble balance-board exercises, e.g. press-ups, lunges, side plank and single-leg standing using the balance board; gait exercises, e.g. one-leg balance, heel-to-toe walking and hip-stabilising exercises; weighted ball exercises, e.g. medicine ball catching and throwing).
- Power and reaction time:
 - definitions of power and reaction time
 - function of power and reaction time
 - methods of training power and reaction time (compound free weights exercises to establish base strength, e.g. squats, lunges, calf raises and bicep curls; plyometric training to develop explosiveness, e.g. lunging, bounding, incline press-ups, barrier hopping and jumping; reaction speed drills specific to athlete's sport, e.g. to control an object, to react to a specific command (voice, starting pistol).

B3 Effectiveness and suitability of training methods for athletes' goals

- The effectiveness of training methods used to improve physical and skill-related fitness in line with desired goals.
- Suitability of training methods for desired training goals, e.g. to support recovery, to aid progression, to counteract opposition tactics.

Learning aim C: Explore the planning of fitness programming

C1 Collecting personal information to aid programme design

- Personal goals:
 - shortterm (set over a short period of time, between one day and one month)
 - medium-term (should give progressive support towards achievement of long-term goals)
 - long-term (what they want to achieve in the long term, and the best way of doing this).
- Aims (details of what they would like to achieve).
- Objectives (how they intend to meet their aims).
- Lifestyle and physical activity history.
- Medical history questionnaire, Physical Activity Readiness Questionnaire (PAR-Q).
- Attitudes towards training and personal motivation for training.
- Gathering and interpreting fitness testing data to establish baseline as well as comparison to benchmarks and normative data.

C2 Principles of training and their application to training programming

- Specificity: training should be specific to personal sport, activity or physical/skill-related fitness goals to be developed.
- Progressive overload: in order to progress, the training needs to be demanding enough to cause the body to adapt, improving performance. This can be done by increasing frequency, intensity, or time, or by reducing recovery times. Not all these methods should be used at once or the increase in workload will be too much.
- FITT principle (frequency, intensity, time and type): in order to achieve progressive overload, the FITT principle should be applied in a way that ensures that progressive overload can be achieved without significantly risking injury as a result of fatigue.
- Reversibility: if training stops, is not frequent enough or the intensity of training is not sufficient to cause adaptation, training effects are reversed.
- Variation: vary the personal training regime to avoid boredom and maintain enjoyment.
- Individual differences/needs: the programme should be designed to meet the needs and requirements of the sport as well as the personal information collected.
- Rest and recovery.
- Adaptation.

C3 Designing periodised training programmes

- Use of personal information and fitness testing data to aid training programme design.
- Performance cycle:
 - event identification
 - event prioritisation
 - goal identification
 - setting SMART targets
 - calendar phases, the purpose and duration of each phase (preparation, pre-competition, competition/tapering, recovery)
 - cycles, the purpose and duration of each cycle (macrocycle/mesocycle/microcycle).
- Application of the principles of training in the planning of the training programme:
 - selection of appropriate methods of training to improve fitness in line with personal information, fitness testing data and identified needs of the sport
 - appropriate application of the FITT principle.
- Schedule for fitness testing in order to monitor progress at key points of the programme.

C4 Planning training sessions

- Safe design of session.
- Appropriate activities for warm-up (light, continuous physical activity to prepare the body for exercise, mobilisation exercises, dynamic/PNF stretching to increase range of motion).
- Selection of appropriate combination of exercises to suit the methods of training.
- Selection of appropriate activities for cool-down (light, continuous physical activity to reduce heart rate, remove lactic acid and prevent blood pooling; static stretching to maintain range of motion).
- Selection of training intensities to suit methods of training, e.g. loading, repetitions, sets.
- Selection of training durations to suit methods of training (individual exercises, session).
- Selection of suitable equipment and facilities to ensure safe training.
- Ways of monitoring intensity, e.g. heart rate monitors, rating of perceived exertion (RPE), training thresholds.

C5 Evaluating the effectiveness of programming and training plan design

- Practicality of the planned training.
- Effectiveness of:
 - methods of training
 - exercises in relation to the demands of the sport
 - intensities and duration of the exercises
 - scheduling of session in the periodised programme in relation to the identified events.
- Suggested adaptations to plan:
 - alternative methods of training
 - alternative exercises in relation to the demands of the sport
 - adaptation to selected intensities and duration of the exercises
 - alternative scheduling of the session in the periodised programme in relation to the identified events.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Examine the fitness requirements, physical characteristics and demands of sport that contribute to effective training and performance		A.D1 Evaluate how the fitness demands, characteristics and movement patterns of the sport influence the planning of an athlete's training.
A.P1 Explain how the fitness demands, characteristics and movement patterns of the sport influence the planning of an athlete's training.	A.M1 Analyse how the fitness demands, characteristics and movement patterns of the sport influence the planning of an athlete's training.	
Learning aim B: Investigate methods of training for physical and skill-related fitness		B.D2 Evaluate the effectiveness of methods of training used to improve physical and skill-related fitness, justifying how they contribute to enhance performance in a chosen sport.
B.P2 Explain methods of training and their effectiveness in improving physical fitness for a chosen sport.	B.M2 Analyse methods of training and their effectiveness in improving physical fitness for a chosen sport.	
B.P3 Explain methods of training and their effectiveness in improving skill-related fitness for a chosen sport.	B.M3 Analyse methods of training and their effectiveness in improving skill-related fitness for a chosen sport.	
Learning aim C: Explore the planning of fitness programming		C.D3 Evaluate the effectiveness of the training programme towards enhancing sports performance, making justified suggestions for adaptations or alternative methods of training.
C.P4 Explain the principles of training to be considered when planning for periodised training and fitness programming.	C.M4 Analyse the design of the training session plan as part of the periodised training programme.	
C.P5 Produce a detailed periodised training programme to improve performance for a chosen sport.		
C.P6 Produce a detailed training session plan for a selected aspect of the periodised training programme.		

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of three summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim: A (A.P1, A.M1, A.D1)

Learning aim: B (B.P2, B.P3, B.M2, B.M3, B.D2)

Learning aim: C (C.P4, C.P5, C.P6, C.M4, C.D3)

Further information for teachers and assessors

Resource requirements

For this unit, learners must have access to suitable fitness training facilities and equipment, for example a sports hall, studio gym or sports lab with appropriate training equipment, such as fixed resistance machines, free weights, CV machines, cones, mats, benches, timing gates, stopwatch. Learners may also require access to more specific equipment for some skill-related training activities, such as SAQ ladders and hurdles, wobble balance boards or training chutes. Learners will also require access to suitable individuals who can act as training programme subjects.

Essential information for assessment decisions

Learning aim A

For learning aim A, learners must choose a specific sport to study. The sport can be either individual or team-based. They must explore the fitness demands, characteristics and movement patterns of that specific sport when considering the influence(s) on the planning of training.

For distinction standard, learners will consider the fitness demands, characteristics and movement patterns of a specific sport, exploring the relevance and significance of each. They will draw conclusions about the influence that each aspect has on the planning of training for an athlete performing that sport. Learners will include specific examples in their work to support their conclusions. They will use appropriate terminology and provide examples to illustrate their points.

For merit standard, learners will present the outcome of a detailed and methodical examination into the influence that the characteristics, demands and movement patterns of a specific sport have on the planning of training for an athlete. They will break down the requirements above in order to interpret and study the interrelationships between them. Learners will provide appropriate examples to support their analysis and will use appropriate terminology.

For pass standard, learners will give a detailed account of the demands, characteristics and movement patterns of the chosen sport along with reasons and/or evidence to support the influence that these aspects have on the planning of an athlete's training. They will include appropriate examples to support their conclusions.

Learning aim B

For learning aim B, learners could use the same sport that was covered in learning aim A. They must identify three methods of training to satisfy the components of physical fitness and at least three methods to satisfy the skill-related components of their chosen sport. The sport can be either individual or team-based.

For distinction standard, learners will consider the advantages, disadvantages and relevance of methods of training for physical and skill-related fitness components in order to make judgements on their effectiveness. They will draw conclusions that are supported by examples, justifying how the methods contribute to the enhanced performance in a chosen sport. Learners suggest ways in which training methods may be adapted to maximise the effectiveness of training for their specific chosen sport. They will articulate their arguments coherently throughout.

For merit standard, learners will present the outcome of a methodical and detailed examination into the methods of physical and skill-related fitness training and their effectiveness in contributing to enhanced performance in a chosen sport. They will break down the training methods and interpret the relationship between each method used and the improvements to physical and skill-related fitness. Learners will use appropriate terminology and provide examples to illustrate their points.

For pass standard, learners will give a detailed account of the methods of training along with reasons and/or evidence to support the use of such methods to improve physical and skill-related fitness for a chosen sport. They will consider the effectiveness of each method and draw conclusions, giving appropriate examples to support these.

Learning aim C

For learning aim C, learners are required to produce a detailed, periodised training programme for the athlete's whole performance cycle, and a training session plan as part of one phase of this programme. The programme and plan must relate to a chosen sport. This could be the same sport as in learning aims A and B. It would be beneficial for learners to take part in a planned session. Learners will then need to evaluate the effectiveness of the programme towards enhancing sports performance.

For distinction standard, learners will consider the effectiveness of the periodised training programme in improving sports performance. They will make judgements about the advantages, disadvantages and relevance of the programme in relation to the whole performance cycle, and the training plan in relation to the specific phase. Learners will draw conclusions about the programme's effectiveness, supported by well-considered examples. They will also make justified recommendations for adaptation or alternatives to the programme, training methods and plan. Learners will use appropriate terminology and provide examples to illustrate their points.

For merit standard, learners will present the outcome of a methodical and detailed examination into the design of the periodised training programme and training session plan. They will consider the appropriateness of the programme design against the performance cycle, the principles of training, the FITT principle and the performance requirements of the chosen sport. They will consider the effectiveness of the training session plan design against the appropriateness of activities, durations, intensities and relevance to the programme and chosen sport. Learners will then interpret the interrelationships between the training programme, the session plan and the performance improvement requirements as a whole. They will support their analysis using appropriate examples and will use appropriate terminology throughout.

For pass standard, learners will give a detailed account of the principles of training along with reasons and/or evidence to support why these principles must be considered when planning periodised training programmes and training session plans. They will draw conclusions as to the relevance of each training principle in relation to programming and the potential impacts of not considering these.

Learners will produce a detailed periodised training programme that covers the complete performance cycle and demonstrates the application of the principles of training and the FITT principle to improve performance in a chosen sport.

Learners will produce a detailed training session plan that relates to one aspect of the broader training programme. The plan must demonstrate appropriate training activities as identified in learning aim B and the principles of training plan design.

Links to other units

This unit links to:

- Unit 1: Sport and Exercise Physiology
- Unit 2: Functional Anatomy
- Unit 3: Applied Sport and Exercise Psychology
- Unit 4: Field and Laboratory-based Fitness Testing
- Unit 5: Applied Research Methods in Sport and Exercise Science
- Unit 6: Coaching for Performance and Fitness
- Unit 9: Research Project in Sport and Exercise Science
- Unit 10: Physical Activity for Individual and Group-based Exercise
- Unit 11: Sports Massage
- Unit 13: Nutrition for Sport and Exercise Performance
- Unit 14: Technology in Sport and Exercise Science
- Unit 15: Sports Injury and Assessment.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities, for example:

- guest speakers
- opportunities to visit suitable businesses.

Unit 9: Research Project in Sport and Exercise Science

Level: **3**

Unit type: **Internal**

Guided learning hours: **60**

Unit in brief

Learners will complete a research project in a sport-based context. It will involve learning about how to plan, do and review a successful research project.

Unit introduction

Have you ever sat and thought how we can help to enhance coach-athlete relationships? What about why childhood obesity is a rising public concern and how we might be able to slow this down? These are questions that people who conduct sport-based research ask, and which can have a significant impact on the work of many professionals who work in sports environments, such as coaches, fitness instructors and teachers.

As a member of the sport and exercise science workforce, research is an important part of your studies. There is an increasing requirement for members of that workforce to become evidence-based practitioners who know what they are doing with their clients and why they are doing it and can support it with evidence. In doing so, this will ensure that practitioners can provide the best quality of service to their clients. By completing your own research project, you will start on the road to fully immersing yourself in the process of becoming an evidence-based practitioner.

Throughout this unit, you will learn the skills required to successfully research a project in sport and exercise science. This will help you to develop your subject-specific knowledge, understanding and skill set in your chosen area. It will also help you to develop wider skills of time management, problem solving and creative thinking. This blend of skill sets will be important for you whatever your preferred progression route, be it higher education or employment.

Learning aims

In this unit you will:

- A** Plan a sport or exercise science-based research project
- B** Carry out a sport or exercise science-based research project
- C** Produce a sport or exercise science-based research report.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Plan a sport or exercise science-based research project	A1 Selecting a research topic and creating a rationale A2 Deciding on aims and research questions A3 Deciding on an appropriate research methodology A4 Structure of the research proposal	A presentation that demonstrates a planned sport and exercise science-based research project.
B Carry out a sport or exercise science-based research project	B1 Data collection B2 Data analysis	A written sport or exercise science-based research report that follows a standard structure.
C Produce a sport or exercise science-based research report	C1 Writing styles appropriate for research projects C2 Structure of the research report	Evidence of collected data. Evidence of analysed data. Witness testimony or observation record as appropriate.

Content

Learning aim A: Plan a sport or exercise science-based research project

A1 Selecting a research topic and creating a rationale

- Selecting a research topic, to include:
 - mind-mapping areas of interest on the course and highlighting what you would like to learn more about
 - consideration of monodisciplinary versus interdisciplinary research
 - looking at print or digital media to identify popular issues within an area of the course
 - discussing ideas with peers, tutors and other relevant individuals
 - reviewing literature.
- Rationale to include:
 - definition – reasons why the project is worth completing
 - applied reasons – how the research might benefit the work of a sport and exercise scientist
 - contextual reasons – if a topic is well understood, looking at it in a different context, such as a different sport
 - social reasons – examining a topic in a particular social group that hasn't been well researched, such as women in sport or ethnic minorities
 - methodological reasons – examining a topic using a different type of method to ones used previously
 - gaps or limitations in previous research – a topic that has not been extensively researched or one in which flaws in previous research have been identified.

A2 Deciding on aims and research questions

- Definitions:
 - research question(s) – the question or set of questions that you seek to answer through the research project
 - aims – what you want to achieve through the research project.
- Turning a research topic into a research question:
 - mind-mapping the different potential research problems within your topic area
 - summarising the main research problem in one sentence
 - highlighting the key question(s) that come out of the research problem.
- Hypothesis and null hypothesis generation in quantitative research:
 - hypothesis – the predicted, testable relationship/difference between two or more variables
 - null hypothesis – a prediction that there will be no relationship/difference between two or more variables.

A3 Deciding on an appropriate research methodology

- Selecting and justifying an appropriate research design, appropriate data collection methods and appropriate data analysis methods.
- Ethical considerations in research.
- Health and safety considerations in research.

A4 Structure of the research proposal

- Title.
- Introduction:
 - 'funnelled' style – starting off broad and focusing down to the aims and research questions
 - background to the research topic that includes key definitions and demonstrates a clear rationale, based on the reviewed literature
 - clearly stated aims and research questions, e.g. hypothesis and null hypothesis if conducting quantitative research.

- Proposed research methodology:
 - written in the future tense, avoiding the first person
 - the proposed research design
 - the proposed data collection method(s) including any necessary human or physical resources
 - the proposed participants and sampling methods
 - the proposed data analysis method(s)
 - ethical considerations as outlined by the British Association of Sport and Exercise Sciences (BASES)
 - suggested timescale for completion.

Learning aim B: Carry out a sport or exercise science-based research project

B1 Data collection

Considerations:

- resource availability – ensuring that human and physical resources required for the project are available, booking the required human and physical resources
- resource familiarity – understanding how equipment and facilities work, correctly operating/using any required equipment or resources
- recording data – safe and secure recording of data using appropriate ICT
- research diary – using a diary to reflect on the process of data collection by writing memos and conducting initial data analysis; the use of an appropriate reflective model, e.g. Kolb's learning cycle, Johns' model of reflection, Gibbs' reflective cycle, to reflect on learning and development.

B2 Data analysis

Considerations:

- resource availability, e.g. ICT available for statistical analysis, peer or tutor availability for qualitative triangulation
- resource familiarity, e.g. correctly using data analysis software
- recording the analysis – safe and secure storage of data analysis
- research diary – using a diary during initial stages of data analysis to record initial reflections and/or primary analysis; the use of an appropriate reflective model, e.g. Kolb's learning cycle, Johns' model of reflection, Gibbs' reflective cycle, to reflect on learning and development.

Learning aim C: Produce a sport or exercise science-based research report

C1 Writing styles appropriate for research projects

- Appropriate style:
 - elegant academic – informative, interesting and readable style that incorporates an appropriate blend of subject-specific terminology and plain English, statements supported by appropriate academic sources.
- Common mistakes:
 - too dry – work uses overly technical language and jargon instead of plain English, work is unnecessarily lengthy, work that is overly referenced
 - too informal – work that is often too discursive, work that contains insufficient subject-specific terminology, work that lacks appropriate referencing.

C2 Structure of the research report

- Title page.
- Abstract:
 - short summary of the research that contains the research questions
 - aims and hypothesis/null hypothesis as required
 - summary method
 - key results
 - key conclusions.

- Acknowledgements – expressing gratitude to anybody that has helped complete the project, highlighting the role that they fulfilled.
- Table of contents.
- List of figures and tables – the title of each figure and/or table and the page number(s) it/ they can be found on.
- Introduction:
 - background to the topic area
 - key definitions
 - rationale
 - research aims
 - research questions
 - hypothesis and null hypothesis, as required.
- Literature review:
 - a written evaluation of appropriate literature that is designed to draw conclusions about the research area
 - highlighting strengths, limitations and gaps in previous research.
- Methodology, including:
 - research design
 - data collection methods
 - participants and sampling
 - data analysis methods
 - writing in the past tense and avoiding the first person
 - ethical considerations.
- Results – descriptive reporting of relevant results from the investigation presented in a format appropriate for the research project.
- Discussion:
 - interpretive section that includes restatement of the aims and results of the study
 - relating results to previous literature
 - consideration of the overall quality of the study
 - implications of the study
 - future research recommendations
 - ethical considerations
 - conclusions.
- References – a Harvard referenced list of all sources used in the reports, included in alphabetical order of author.
- Appendices – any additional information which provides support for your project, but is not included in the main report, e.g. blank informed consent forms, witness testimony forms, observation records, participant information documents, collected raw data.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Plan a sport or exercise science-based research project		A.D1 Justify the research methodology for a self-selected sport or exercise science-based research project.
<p>A.P1 Produce an appropriate rationale, research aims and research questions for a self-selected sport or exercise science-based research project.</p> <p>A.P2 Explain an appropriate research methodology for a self-selected sport or exercise science-based research project.</p>	<p>A.M1 Interpret literature in order to support and develop the rationale for a self-selected sport or exercise science-based project.</p> <p>A.M2 Analyse an appropriate research methodology for a self-selected sport or exercise science-based research project.</p>	
Learning aim B: Carry out a sport or exercise science-based research project		B.D2 Evaluate the data collection and data analysis for a self-selected sport exercise science-based research project. C.D3 Evaluate the research findings and the quality of the sport or exercise science-based research project using an appropriate evidence base.
<p>B.P3 Complete appropriate data collection and analysis for a self-selected sport or exercise science-based research project.</p> <p>B.P4 Complete a research diary that documents the data collection and data analysis, and reflects on the research process using an established model of reflection.</p>	B.M3 Analyse the process of data collection and data analysis for a self-selected sport or exercise science-based research project.	
Learning aim C: Produce a sport or exercise science-based research report		
<p>C.P5 Explain the research, from a sport or exercise science-based project, using an appropriate writing style.</p> <p>C.P6 Produce a sport or exercise-based research report that uses a standard structure.</p>	C.M4 Analyse the research findings, quality of research, and future directions arising from the sport or exercise science-based research project.	

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of two summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim: A (A.P1, A.P2, A.M1, A.M2, A.D1)

Learning aims: B and C (B.P3, B.P4, C.P5, C.P6, B.M3, C.M4, B.D2, C.D3)

Further information for teachers and assessors

Resource requirements

For this unit, learners must have access to:

- appropriate equipment for recording data, e.g. Dictaphones™, tablets or laptop computers, video or still cameras.
- appropriate data analysis programmes for statistical analysis should learners choose to complete a quantitative project, e.g. Microsoft® Excel, SPSS®.

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will provide reasons and evidence to support the appropriateness of their selected research methodology. As part of this, learners will consider the quality of their research, for example specific types of validity and reliability, accuracy, precision and trustworthiness, appropriate for the research methodology. Justifications should be supported with evidence such as research methods texts. Additionally, this evidence may come in the form of published precedents where previous studies have adopted a particular methodological approach.

For merit standard, learners will give clear details of the research design, data collection methods, data analysis methods, and ethical and health and safety considerations for their self-selected research project. Clear evidence to support these details, for example from appropriate research methods literature, and the BASES position statement on ethics and participation in the research of young people, should also be included. Learners must review relevant literature about their chosen research topic in order to demonstrate an understanding of the trends, which can then be used to support and develop the rationale. Learners are required to clearly state the meaning, purpose or qualities of research. An example of this could be learners supporting their argument for a contextual rationale by stating that a particular strength and conditioning method has not been rigorously tested within a given sport, despite being widely used.

For pass standard, learners will present their research proposal using the structure outlined in the unit content. Learners must present an accurate and realistic rationale for the research project that covers one or more of the different types of rationale highlighted in the unit content. Following on from the rationale, learners are required to produce clear and concise research question(s) and research aim(s). If learners plan to complete a quantitative research project, they must also include a clear and concise research hypothesis and null hypothesis. It should be clear from the assessment evidence provided that learners have decided on the research topic using one or more of the methods outlined in the unit specification. This could be evidenced in a number of different ways, for example, via audio recordings of discussions with tutors or peers, annotated documents, such as journal articles, or learner-produced mind or concept maps. Observation records or witness testimony forms cannot be used as the sole form of evidence for this criterion, but may be used as supplementary evidence. Learners must select an appropriate research methodology for the research topic.

Learning aims B and C

For distinction standard, learners will draw on varied sources of information, for example different journal articles, appropriate textbooks, and government agency documents, theories or concepts to examine the relevance of their research findings. This relevance can be expressed through practical implications, research considerations or a combination of the two. Learners should clearly demonstrate how the interpretations of research findings are linked with the strengths and limitations of the research project, which must, in turn, form the foundation of future research directions. Strengths, limitations and future research directions must be supported by appropriate evidence, for example research methods texts or journals that will support learners' arguments about how the future research directions will increase the overall quality of future research.

For merit standard, learners will clearly show the findings of their results and their arguments or viewpoints associated with these findings. Learners must provide clear details of the strengths and limitations of the research, providing clear links to the aims and research questions of the project. Supporting evidence from appropriate sources, for example subject-specific texts, should be included where necessary. Learners must independently manage the data collection and analysis process. Where health, safety, ethical or wellbeing considerations for a project predicate teacher intervention, for example if a teacher is required to take fingertip blood samples, if organisational health and safety policies dictate that there must be adult supervision at all times, this must be accurately and appropriately documented. If a teacher witnesses learners incorrectly using equipment and/or facilities and has to intervene so that data collection can be completed, learners cannot achieve this criterion.

For pass standard, learners will produce their research report using the standard structure as outlined in the unit content. Learners must convey their ideas and information using an appropriate style of writing: fluent English language prose, which uses an appropriate combination of subject-specific terminology and plain English. Diagrams may be used to support appropriate elements of the methodology section. The diary should include information about where data collection and analysis has followed the plan and where it was necessary to make any changes, including reasons why. For qualitative and mixed-research projects, learners should include reflections on any patterns that start to emerge through the data collection and qualitative analysis process. Learners, with the support of teachers, must provide evidence that they have appropriately collected and analysed the data. Evidence for data collection may include video or annotated photograph evidence of learners collecting data, audio recordings of interview data in qualitative studies, spreadsheets where quantitative data has been recorded, or completed questionnaires or surveys. Evidence for data analysis may include video footage or annotated photographs or screenshots of qualitative or quantitative data analysis programmes being used.

Links to other units

This unit links to:

- Unit 3: Applied Sport and Exercise Psychology
- Unit 4: Field and Laboratory-based Fitness Testing
- Unit 5: Applied Research Methods in Sport and Exercise Science
- Unit 7: Biomechanics in Sport and Exercise Science
- Unit 8: Specialised Fitness Training
- Unit 11: Sports Massage
- Unit 12: Sociocultural Issues in Sport and Exercise
- Unit 14: Technology in Sport and Exercise Science.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit.

Unit 10: Physical Activity for Individual and Group-based Exercise

Level: **3**

Unit type: **Internal**

Guided learning hours: **60**

Unit in brief

Learners cover theoretical and practical requirements for planning and instructing individual and group-based exercise sessions.

Unit introduction

For many years, the health and fitness industry has included individual exercise sessions as well as group exercise classes as methods of helping people to participate in regular physical activity. To work as a physical activity instructor a range of planning and practical skills are required.

In this unit, you will gain an understanding of how to establish effective working relationships with individuals and groups of participants, which is essential in order to ensure that participants trust you and come back for business. You will also explore ways in which to help to support participants to encourage regular participation in physical activity. You will explore the types of exercises that can be used for both individual exercise sessions and group-based classes. You will then plan and instruct an individual and a group-based exercise session before carrying out a review of your sessions, allowing you to identify your strengths and areas for improvement in planning and instructing.

The knowledge and skills this unit gives you are an exciting combination of theory and applied aspects to help you gain an improved understanding and practical experience of instructing individual and group-based exercise sessions. These activities will prepare you for a variety of fitness instructing and sports coaching careers, and form a good basis for higher education study in sport and further qualifications such as sport and exercise science.

Learning aims

In this unit you will:

- A** Explore the processes of health screening prior to physical activity participation
- B** Examine different types of exercise for individual and group-based exercise sessions
- C** Undertake planning and instructing of individual and group-based exercise sessions.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Explore the processes of health screening prior to physical activity participation	A1 Participant screening A2 Factors affecting safe exercise participation	A written report focusing on screening activity results, factors affecting safe exercise participation and recommendations based on the results and factors, supported by evidence of completed lifestyle screening activities.
B Examine different types of exercise for individual and group-based exercise sessions	B1 Performing exercises safely B2 Types of cardiovascular exercises B3 Types of resistance-based exercises B4 Activities for an individual exercise session B5 Activities for a group-based exercise session	
C Undertake planning and instructing of individual and group-based exercise sessions	C1 Aims and objectives of the exercise session C2 Individual exercise session planning C3 Group exercise session planning C4 Pre-exercise session preparation C5 Preparing participants for exercise session C6 Instructing an individual or group-based exercise session C7 Reviewing own performance in providing an individual or group-based exercise session	An evaluative report into the planning and delivery of the gym-based session, supported by an individual exercise session plan, a group exercise session plan and observation records/video evidence of gym-based exercise session delivery.

Content

Learning aim A: Explore the processes of health screening prior to physical activity participation

A1 Participant screening

- Selection of appropriate screening methods:
 - questionnaires (PAR-Q, lifestyle questionnaires)
 - interviews
 - observation
 - informed consent
 - health monitoring tests, e.g. blood pressure, resting heart rate, body mass index (BMI), waist to hip ratio, lung function – interpretation of health monitoring data against normative data.
- Reasons for temporary deferral of exercise for participants:
 - concerns over health from screening processes
 - contraindications – pregnancy, treatment for chronic health problems.
- Maintaining client confidentiality.

A2 Factors affecting safe exercise participation

- Exercise intensity:
 - appropriate to health-related level
 - methods of measuring exercise intensity, e.g. percentage of heart rate max, rating of perceived exertion (RPE) scale, training zones for cardiovascular health and fitness.
- Factors affecting safe participation for specific groups:
 - children, e.g. should not take part in heavy resistance exercises, short periods of exercise with rest periods
 - antenatal or postnatal woman, e.g. avoid high impact and high intensity exercises, issues with stretching, limit abdominal exercises, avoid supine exercise after 16 weeks of pregnancy, avoid isometric or overhead resistance exercises
 - older person (50+), e.g. longer, more gradual warm-up period, gradually tapered cool-down, avoid high impact exercises, balance related concerns, incorporate functional life-related movements.

Learning aim B: Examine different types of exercise for individual and group-based exercise sessions

B1 Performing exercises safely

- Warm-up:
 - pulse raises
 - mobiliser
 - stretching.
- Cool-down:
 - pulse lowers
 - stretching (maintenance and developmental).
- Safe alignment of exercise position.
- Health and environmental factors which can influence safety and group or individual working space.
- Developing client co-ordination by building exercises/movements up gradually.
- Intensity – adapting exercise/movements to increase and decrease the intensity.
- Impact – high and low impact exercises.
- Alternative exercises for specific participants, e.g. wall press-ups for the older adult, low impact exercises for antenatal participants.

B2 Types of cardiovascular exercises

- Cardiovascular machines:
 - treadmill
 - cycle
 - rowing machine
- Cardiovascular exercises, e.g. jogging, skipping, jumping jacks, step-ups, shuttle runs.

B3 Types of resistance-based exercises

- Types of resistance – free weights:
 - dumbbells
 - barbells
 - resistance weight machines
 - bands
 - body weights.
- Weight training exercises:
 - front raise
 - bent arm pullover
 - shoulder press
 - lateral raise
 - flyes
 - bicep curl
 - lunge
 - squat.
- Body weight resistance exercises:
 - press-ups
 - triceps dips
 - plank
 - sit-ups
 - lunge
 - squat
 - prone back raise.

B4 Activities for an individual exercise session

- Gym-based exercise session:
 - cardiovascular exercises
 - resistance-based exercises.

B5 Activities for a group-based exercise session

- Circuit exercise session.
- Stations to improve aerobic endurance:
 - shuttle runs
 - jogging on the spot
 - jumping jacks
 - spotty dogs
 - squat thrusts
 - knee lifts
 - step-ups
 - skipping.

- Stations to improve muscular strength and endurance:
 - shoulder press
 - dumbbell flyes
 - upright row
 - lateral raise
 - bicep curl
 - triceps extensions
 - dumbbell lunge
 - barbell squat
 - calf raise
 - triceps dips
 - press-ups
 - lunges
 - squats
 - side bends.
- Circuit cards:
 - name of exercise
 - diagram
 - teaching points
 - adaptations
 - progressions
 - alternatives.
- Circuit training layouts:
 - square
 - lined circuit
 - bow tie
 - circular
 - corners.

Learning aim C: Undertake planning and instructing of individual and group-based exercise sessions

C1 Aims and objectives of the exercise session

- Individual or group-based exercise session.
- Gathering information from the participants to determine aims and objectives of exercise session.

C2 Individual exercise session planning

- Appropriate exercises are identified.
- Appropriate sequences of exercises.
- Appropriate timings of each exercise.
- Selection of the correct equipment for the session.
- Adapting a gym-based exercise programme to ensure appropriate progression and/or regression.

C3 Group exercise session planning

- Warm-up.
- Main component – cardiovascular endurance, muscular strength or muscular endurance.
- Cool-down.
- Length of time for each component.

C4 Pre-exercise session preparation

- Checking equipment.
- Ensuring area is sufficient and safe for the session.
- Appropriate temperature and ventilation.

C5 Preparing participants for exercise session

- Check participant's ability and any medical conditions.
- Inform the participant of the physical and technical demands of each exercise and the purpose and value of each exercise.
- Confirm or revise plans with the participant as appropriate.
- Demonstrate any specific movements.
- Advise participants of the facility's emergency procedures.

C6 Instructing an individual or group-based exercise session

- Explain and correctly demonstrate each exercise.
- Communicate as appropriate to the needs of the participant and the environment.
- Change position to observe participant.
- Monitor the safety and intensity of each exercise.
- Provide timely clear instructions and feedback.
- Adapt exercise with suitable progressions and regressions according to participant needs.
- Safe and effective cool-down activities.
- Feedback to the participant on how they have performed.
- Allow the participant to feed back to reflect on the session and ask questions.
- Follow correct procedures for checking and putting away equipment used.
- Ensure the area used is left in an acceptable condition for future use.

C7 Reviewing own performance in providing an individual or group-based exercise session

- Evaluate how well the exercises met the participants' needs.
- Relationship with the participants – how effective and motivational it was and how well the instructing style matched the participants' needs.
- Ways to improve personal practice.
- Value of reflective practice.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Explore the processes of health screening prior to physical activity participation		A.D1 Evaluate the screening from one individual, justifying suggestions for progression to safe exercise participation.
A.P1 Perform participant screening and interpret the results for one individual. A.P2 Explain factors that can affect safe exercise participation for three individuals in different specific groups.	A.M1 Perform effective screening using methods that are appropriate to the needs of one individual. A.M2 Assess the factors affecting the safe exercise participation of three specific individuals, making recommendations for their safe exercise participation.	
Learning aim B: Examine different types of exercise for individual and group-based exercise sessions		BC.D2 Evaluate own performance in the planning and delivery of an individual or group-based exercise session to specific participants, justifying choices of adapted and alternative exercises, session strengths and recommendations for self-improvement. C.D3 Evaluate the impacts of participant assessment and choice of exercise on the planning and instruction of safe and effective exercise sessions.
B.P3 Explain different methods of cardiovascular endurance training and resistance training for an individual exercise session. B.P4 Explain different methods of cardiovascular endurance training and resistance training for a group exercise session.	B.M3 Compare different methods of cardiovascular and resistance training for individual and group exercise sessions, justifying the uses of each for participants with different needs.	
Learning aim C: Undertake planning and instructing of individual and group-based exercise sessions		
C.P5 Plan and deliver a safe and effective individual or group-based exercise session that includes the performance of safe and effective cardiovascular and resistance-based exercises. C.P6 Review own performance in the delivery of an individual or group-based exercise session, identifying strengths and areas for improvement.	C.M4 Plan and deliver a comprehensive individual or group-based exercise session using effective communication and offering adapted and alternative exercises for different specific participants. C.M5 Review own performance in the delivery of an exercise session, explaining strengths and providing recommendations for self-improvement.	

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of two summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim: A (A.P1, A.P2, A.M1, A.M2, A.D1)

Learning aims: B and C (B.P3, B.P4, C.P5, C.P6, B.M3, C.M4, C.M5, BC.D2, C.D3)

Further information for teachers and assessors

Resource requirements

For this unit, learners must have access to suitable exercise facilities and equipment, for example, a gym with cardiovascular equipment, fixed resistance machines and free weights. Learners will also require access to suitable individuals who can act as participants.

Essential information for assessment decisions

Learning aim A

For this learning aim students will need to undertake a variety of screening processes, including questionnaires that can be completed independently or via an interview process. Learners will need to be able to carry out health monitoring tests as part of the screening process.

For distinction standard, learners will interpret the results of the lifestyle questionnaire and health screening tests for one participant and evaluate how the results can have an impact on that person's lifestyle and exercise choices. They will need to be able to provide suggestions as to what sorts of exercises would be suitable for that person, with reasoning and justification from evidence discovered in the screening processes.

For merit standard, learners will carry out different methods of screening and select the most appropriate method for one participant in order to gain the maximum amount of information when interpreting and understanding the participant's lifestyle and exercise aims. Learners will present a careful consideration of the factors affecting the safe participation of three specific individuals. Learners will then provide suggestions to support the participant in ensuring that they exercise safely in line with their specific identified requirements. Learners should also provide suggestions for appropriate types of exercises and contraindications for participants from specific groups.

For pass standard, learners will carry out appropriate screening activities for one participant and interpret the results in terms of any lifestyle concerns and exercise requirements. Learners are able to identify any requirements for the participant to help them to exercise safely in relation to the information supplied in the screening processes. Learners consider the factors that can affect the safe participation of people from three specific groups. They give reasons as to why specific groups are affected by different, or similar, factors and support these views with appropriate examples for each specific group.

Learning aims B and C

The evidence for learning aim C could relate to an individual gym-based exercise session planned and delivered to one of the participants that was screened in learning aim A, or to a group-based circuit exercise session.

For distinction standard, learners will evaluate how they planned and delivered the exercise session, making judgements and forming conclusions on their own performance. Their judgements will be based on the effectiveness and appropriateness of the exercise techniques and communication methods they planned and used for cardiovascular endurance training and resistance training, and the ways in which they adapted each exercise to make them more or less challenging, depending on the needs of the participant(s). Their judgements will be supported by evidence of observation and/or feedback from the participant(s) taking part in the session.

From this evaluation they will justify their areas of strength, areas where improvement is needed and recommendations for how these improvements can be made.

For merit standard, learners will identify the main factors relating to three or more different methods of cardiovascular and resistance training for both individual and group-based exercise sessions, explaining the similarities, differences, advantages and disadvantages. They will then select different types of equipment for specific participants based on the participants' specific needs.

Learners will provide a detailed plan for an exercise session that takes into account the needs of the participant(s) and provides adaptations to each exercise. Learners will carry out the correct techniques when performing cardiovascular endurance training and resistance training. They will adapt each exercise or provide alternative exercises to meet the needs of the participant(s). Learners will demonstrate effective communication, both verbal and non-verbal, that meets the needs of the participant(s) and ensures that they know exactly what to do and are motivated throughout the exercise session. Learners will then carry out a review of their delivery of the exercise session, explaining what they did well and not so well, and the reasons for this. Learners also provide considered explanations and recommendations as to how they could improve their exercise session delivery in the future.

For pass standard, learners will show that they understand the different types of equipment available for cardiovascular endurance training and resistance training for both groups and individuals. The types of equipment that can be used will also need to be considered in relation to how one piece of equipment can be more suited than another to an individual's needs and preferences. Learners are able to prepare an exercise session that includes a minimum of three types of cardiovascular equipment and five resistance-based exercises. The plan must include relevant information about the aims and objectives of the session, the participant's needs, the equipment to be used and the exercise activities taking place. The activities must be safe and effective, appropriate to the participant's needs and requirements and designed to achieve the planned outcomes. Learners then need to show that they can deliver the planned session safely and effectively, demonstrating correct technique and providing accurate teaching points that are appropriate to the needs and limitations of the participant(s). The cardiovascular and resistance exercises and equipment used are likely to achieve the planned results and are unlikely to cause injury to the participant. Learners then need to review how the session went and identify what worked well in the session and areas for improvement.

Links to other units

This unit links to:

- Unit 1: Sport and Exercise Physiology
- Unit 2: Functional Anatomy
- Unit 3: Applied Sport and Exercise Psychology
- Unit 4: Field and Laboratory-based Fitness Testing
- Unit 6: Coaching for Performance and Fitness
- Unit 8: Specialised Fitness Training
- Unit 11: Sports Massage
- Unit 13: Nutrition for Sport and Exercise Science
- Unit 14: Technology in Sport and Exercise Science
- Unit 15: Sports Injury and Assessment.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit.

Unit 11: Sports Massage

Level: **3**

Unit type: **Internal**

Guided learning hours: **60**

Unit in brief

Learners study the sports massage profession, the importance of sports massage to the performer, and how to conduct a consultation, assessment and sports massage.

Unit introduction

Participation of individuals at various ages and levels in sport and exercise continues to increase in the UK. Participating in regular exercise has many benefits, but also unwanted effects on the soft and connective tissues of the body. These can have a profound effect on the individual's performance, including increasing the risk of injury and affecting their ability to carry out daily living tasks. In order for individuals to train, perform or compete at their best, sports massage is administered for physical, mechanical and psychological effects. The sports massage professional bodies continue to support the growth of the profession and define the industry standards.

In this unit, you will explore the sports massage profession, including the standards of industry practice, professional associations and the role of the sports massage practitioner. You will explore all components of consultation, assessment and sports massage, in order to safely and effectively plan and conduct a treatment plan for two contrasting sports performers. Finally, you will explore the importance of sports massage to the sport and exercise performer, considering the physical, mechanical and psychological benefits.

These activities will prepare you for a variety of careers in the sports science sector. Although this unit is not designed to help develop you into an accomplished sports massage practitioner, you will be able to confidently develop your studies at university in related sports science, sports therapy or sport and exercise science-related qualifications.

Learning aims

In this unit you will:

- A** Understand the sports massage profession
- B** Undertake client consultation and assessment
- C** Carry out sports massage on a sports performer
- D** Examine the importance of sports massage to the sport and exercise performer.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Understand the sports massage profession	A1 Industry standards of practice A2 Professional associations A3 Sports massage practitioner role	An extended essay focused on discussing industry standard practices, professional associations and the role of the sports massage practitioner.
B Undertake client consultation and assessment	B1 Assessment B2 Treatment plan	Learners will need to select two contrasting sports performers. For each performer, conduct a consultation and assessment and formulate an appropriate treatment plan with justification.
C Carry out sports massage on a sports performer	C1 Physical effects C2 Considerations for treatment	Conduct sports massage in accordance with the treatment plan. Written justification will address the treatments administered, discussing the physiological, mechanical and psychological responses to sports massage. The effectiveness, future recommendations and considerations will also be justified.
D Examine the importance of sports massage to the sport and exercise performer	D1 Physical effects D2 Mechanical effects D3 Psychological effects	A report evaluating the importance of sports massage and assessment in ensuring optimum performance of the sports performer.

Content

Learning aim A: Understand the sports massage profession

A1 Industry standards of practice

The sports massage profession should be discussed with regard to the standards of industry practice required and how these standards are applied to all working environments, including clinical, non-clinical, events and sports clubs.

- Health and safety – current legislation in health and safety at work (HSWA), employers' liability and compulsory insurance, health and safety and first aid regulations, management of safety at work, manual handling operations and date protection.
- Insurance – professional indemnity, malpractice, public liability.
- Safeguarding – child protection legislation, child protection and vulnerable adults, chaperoning.
- Environment – comfortable, safe, secure, spacious, clean, private, ventilation, modified to venue as appropriate, first aid kit, access to a phone.
- Equipment – couch, mediums (oil, talc, cream), bolster, towels, cleaning/hygiene materials.
- Protocol in emergency situations – organisational establishment, health and safety.
- Therapists' conduct – personal hygiene, appropriate dress, appearance, attitude, code of conduct.

A2 Professional associations

Professional associations should be explored with regard to their role, function, benefits, continuing professional development (CPD) requirements and professional standards.

- Associations – Society of Sports Therapists (SST), The British Association of Sport Rehabilitators and Trainers (BASRaT), Complementary and Natural Healthcare Council (CNHC), Sports Massage Association (SMA), Federation of Holistic Therapists (FHT).

A3 Sports massage practitioner role

- Role – deliver safe and effective massage to meet the client's needs, pre- and post-event massage, injury prevention, enhance athletic performance, optimising recovery, when to refer to other practitioners.
- The role of the sports massage practitioner should be clearly defined and discussed in relation to working as part of a multidisciplinary team.
- As part of a multidisciplinary team – osteopath, chiropractor, physiotherapist, general practitioner, radiographer, sports psychologist, sports scientist, nutritionist.

Learning aim B: Undertake client consultation and assessment

Practical application of consultation and assessment skills should be explored to allow confident and effective application.

B1 Assessment

- Subjective assessment:
 - personal details – date of birth, occupation, past medical history, medical conditions, medication, activity and lifestyle history, client aims
 - condition – when, cause, symptoms, pain, aggravating factors, informed consent.
- Objective assessment:
 - postural assessment – asymmetrical, kyphotic, lordotic, scoliosis, flat back, observation
 - pelvis tilt – anterior, posterior, lateral, palpations of area, range of active movement.

Understanding of consultation and assessment findings should be confirmed in order to develop safe and appropriate treatment plans, applying professional standards at all times.

B2 Treatment plan

- Clinical reasoning and planning – contraindications, aim, type of treatment, benefits and effects, treatment duration, massage techniques and considerations, medium, explanation to performer.
- Criteria for proceeding with treatment – pain-free movement patterns, free from disease, aches and pains that are not injury-related, areas of scar tissue, areas of tension or tightness, sport performance enhancement, tissue is non-pathological, modifying contraindications.
- Need for referral – red flag symptoms, pathological tissue, without chaperone if a child or vulnerable adult, global contraindications, local contraindications, exceeds boundaries of practitioner, inflammation present, co-existing pathology.

Learning aim C: Carry out sports massage on a sports performer**C1 Massage application**

Practical application of sports massage should be explored to enable confident and effective application, applying professional standards at all times.

- Types of massage – pre-event, post-event, maintenance, injury prevention, general maintenance.
- Techniques – effleurage, petrissage, frictions – linear, cross-fibre, tapotement, compressions, vibrations.

C2 Considerations for treatment

Factors to be considered during the application of sports massage should be understood and demonstrated confidently and effectively.

- Techniques – sequence of techniques, direction, depth of pressure, speed, differing application to muscle groups, appropriate mediums for technique and client.
- Client position – prone, supine, side lying, seated.
- Body positioning – body weight transfer, therapist posture.
- Legalities – record keeping and storage, informed consent and insurance.
- Adverse reactions – rash, erythema, allergic reaction.
- Aftercare advice – rest, hydration, erythema, possible treatment effects, stretches, opportunity for client feedback.
- Contraindications – when to refer a client, when a sports massage is ill-advised, when and how a treatment plan should be modified.

Learning aim D: Examine the importance of sports massage to the sport and exercise performer**D1 Physical effects**

The physical and mechanical benefits should be discussed in relation to massage techniques and sports performers from a contrasting range of sports, using specific examples.

- Benefits – stimulating blood and lymphatic flow, improving local area metabolism, tissue permeability, removal of waste products and promotion of recovery, autonomic, sympathetic and parasympathetic nervous system, muscle stimulation, lymphatic drainage, reduction in delayed onset of muscle soreness.
- Techniques:
 - effleurage, petrissage
 - frictions – linear, cross-fibre, tapotement, compressions, vibrations.

D2 Mechanical effects

The mechanical benefits should be discussed in relation to massage techniques and sports performers from a contrasting range of sports, using specific examples.

- Benefits – improve mobility and range of movement, breakdown of adhesions, mobilise muscle fibres, reducing and remodelling scar tissue, improve kinaesthetic awareness.

- Techniques:
 - effleurage, petrissage
 - frictions – linear, cross-fibre, tapotement, compressions, vibrations.

D3 Psychological effects

The psychological benefits should be discussed in relation to massage techniques and sports performers from a contrasting range of sports, using specific examples.

- Psychological – enhanced cognition, emotion and performance behaviour, reduced feelings of exhaustion, reduced stress, enhanced emotional wellbeing, improved body awareness, pain reduction, relaxation, reduced anxiety, promotion of recovery, psychological preparation, reduction in pain, improved mood, calmness, self-confidence.
- Techniques:
 - effleurage, petrissage
 - frictions – linear, cross-fibre, tapotement, compressions, vibrations.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Understand the sports massage profession		A.D1 Evaluate the sports massage standards of practice in a variety of sporting environments, and the benefits of working in a multi-disciplinary team.
A.P1 Explain the role of a sports massage practitioner, the relevant standards of practice and professional associations.	A.M1 Discuss sports massage standards of practice and professional associations using specific examples.	
Learning aim B: Undertake client consultation and assessment		B.D2 Justify the consultation and assessment procedure adopted, as well as both treatment plans produced for the two contrasting sports performers.
B.P2 Conduct client consultations and assessments on two contrasting sports performers and formulate safe treatment plans for each performer.	B.M2 Conduct client consultations and assessments on two contrasting sports performers in a confident and effective manner and produce a safe and effective treatment plan for each.	
Learning aim C: Carry out sports massage on a sports performer		CD.D3 Evaluate the physiological, mechanical and psychological responses to the two sports massages performed, justifying the effectiveness, future recommendations and considerations.
C.P3 Conduct sports massage treatments appropriately for two contrasting sports performers, ensuring sports massage standards are upheld.	C.M3 Conduct sports massage treatments in a confident and effective manner for two contrasting sports performers, providing justification for treatments administered.	
Learning aim D: Examine the importance of sports massage to the sport and exercise performer		
D.P4 Explain the physiological and mechanical responses to sports massage.	D.M4 Discuss the physiological, mechanical and psychological responses to each sports massage, with regard to the requirements of the sports performers, using specific examples.	
D.P5 Explain the psychological responses to sports massage.		

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of three summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim: A (A.P1, A.M1, A.D1)

Learning aim: B (B.P2, B.M2, B.D2)

Learning aims: C and D (C.P3, D.P4, D.P5, C.M3, D.M4, CD.D3)

Further information for teachers and assessors

Resource requirements

For this unit, learners must have access to sports massage facilities, including sports massage tables, towels, stools, trolleys, screens and various mediums and supports.

The teacher should be appropriately qualified to a minimum of Level 3 Sports Massage (QCF), or hold a degree in sports therapy or other related discipline that covers the unit content adequately.

Learners will need to take part as clients in order to be able to practice practical skills.

Essential information for assessment decisions

Learning aim A

A vocationally relevant scenario for a sports massage practitioner may be used to set an appropriate context to allow full coverage of the unit content. As an alternative, learners can independently research the relevant working environments, including clinical, non-clinical, events and sports clubs. Learners will produce an extended essay that demonstrates an understanding of the sports massage profession, including industry standards of practice, professional associations and the role of the sports massage practitioner.

For distinction standard, learners will consider the sports massage standards of practice, including industry and professional association standards, in a variety of sporting environments such as clinical, non-clinical, events and sports clubs. Learners will examine the strengths, weaknesses and significance of the standards, making judgements about their effectiveness. Learners will consider the role of the sports massage practitioner as part of a multi-disciplinary team, exploring the relationship with other professionals who may work as part of the team to support the performer. Learners will draw conclusions about the benefits to the sports massage therapist of working in a multi-disciplinary team. Learners will support their conclusions with well-considered examples.

The information presented will be factually correct and use concise written language. Correct terminology and language should be evident.

For merit standard, learners will consider sports massage standards of practice and professional associations using specific examples. Examples should reflect the range of unit content, be specific to the therapist and be inclusive of all types of working environments, including clinical, non-clinical, events and sports clubs. For example, health and safety should be discussed using clear examples relating to a range of working environments; therapist equipment requirements should be discussed with regard to specific requirements in different environments using specific examples.

There will be few inaccuracies relating to the use of terminology. Discussion will demonstrate clarity of thought and expression and be easy to understand. Specific examples will have been used.

For pass standard, learners will demonstrate an understanding of the role of the sports massage practitioner and the relevant standards of practice that a therapist should uphold, as well as professional associations that are available to join.

The role of a sports massage practitioner should be explored and explained. Industry standards of practice explained will include health and safety, insurance, child protection and protection of vulnerable adults, environment, equipment and protocol in emergency situations. Therapists' conduct should be explained. Professional associations should be explained with regard to their role, function, benefits of membership, CPD requirements and professional standards.

The essay may have occasional inaccuracies with regard to terminology and explanations. However, the information should be largely factually correct. Where appropriate, annotation such as diagrams and pictures is encouraged to support learners' explanations.

Learning aim B

Using two contrasting sports performers (the same performers will ideally be used for both consultation and assessment, and the application of the sports massage), learners will conduct practically (video/annotated supplementary evidence required) a full client consultation and assessment and produce a safe treatment plan for each performer. Learners need to justify the consultation and assessment procedure administered to the performers, and justify the treatment plans produced.

For distinction standard, learners will produce written evidence that supports their approach to the consultation and assessment procedures adopted. Learners will need to provide full justification for the treatment plans produced for each sports performer and will use appropriate evidence to support their opinions.

For merit standard, learners will need to conduct the client consultation and assessment for two performers on separate occasions. All interactions will be performed in a confident and effective manner. Confident means that there should be no hesitation or uncertainty when conducting the consultation, assessment or sports massage treatment. Effective means that it will need to have the capability of producing the expected/intended result if the consultation, assessment and sports massage were to be applied in a real-life industry situation.

Learners will give reasons to prove the validity of the treatments administered.

For pass standard, learners will need to select two sports performers with contrasting sports massage requirements, in order to fulfil the unit content and assessment requirements. For example, contrasting requirements to be considered include pre-event or post-event massage, injury prevention to a runner or focusing on the application of techniques to the lower limb in order to help prevent lower limb injuries associated with athletes and running. For each performer, learners will conduct a consultation and assessment, including all aspects of the subjective and objective assessment, in order to formulate a safe treatment plan. In order for the treatment plan to be safe, it will need to be capable of producing the expected/intended result if the treatment plan were to be applied in a real-life industry situation. The treatment plan will evidence full clinical reasoning and planning for the sports massage to be performed, confirmation of criteria to proceed with treatment and confirmation of understanding of the need for referral. Before any treatment is commenced for the assessment of learning aim C, the assessor should ensure the treatment plan is appropriate and that it is safe for the learner to proceed.

When conducting the client consultation and assessment, learners may show some nervousness or indecision when performing the treatment methods; however, correct application will be evident.

The written work may have occasional inaccuracies with regard to terminology and explanations. However, the information should be largely factually correct. Where appropriate, annotation such as diagrams and pictures is encouraged to support the learners' explanations.

Learning aims C and D

Using two contrasting sports performers (the same performers will ideally be used for both consultation and assessment (learning aim B), and the application of the sports massage), learners will, on separate occasions, apply and perform sports massage to two sports performers, evaluating the physiological, mechanical and psychological responses to the sports massage performed.

Learners will execute the safe treatment plans formulated for learning aim B. Learners will also need to justify the effectiveness of the treatment performed in relation to the treatment plan and sports performer's requirements, making recommendations and considerations for future practice.

For distinction standard, learners will carefully consider the physiological, mechanical and psychological responses to the two sports massages performed. They could explore the advantages and disadvantages of each response and the significance of these. Learners should make judgements and draw conclusions about the relationships between the massage performed and the response(s) received. Learners will use evidence to prove the effectiveness of the treatment and to make future recommendations and considerations for further sports massage treatment.

The information presented will be factually correct and use concise written language. The use of correct terminology and language will be evident.

For merit standard, learners will need to conduct a sports massage ideally on the same two performers that have been previously assessed (learning aim B). All interactions will be performed in a confident and effective manner. Confident means there should be no hesitation or uncertainty when conducting the consultation, assessment or sports massage treatment. Effective means it will need to have the capability of producing the expected/intended result if the consultation, assessment and sports massage were to be applied in a real-life industry situation.

Learners consider the sports massages performed in relation to each sports performer. They examine the physiological, mechanical and psychological responses to each sports massage, their importance, and the relationships that these have with the sports performers' requirements. Learners will support their findings with specific examples throughout.

There may be a few inaccuracies relating to the use of terminology but discussion will be clear, logical and coherent.

For pass standard, learners will, on separate occasions, conduct sports massage on the performers. It is imperative that industry standards are upheld at all times, with particular regard to health and safety and therapist conduct, including appropriate dress, environment and equipment preparation. There should also be an awareness of emergency procedures in the case of fire (clear instruction should be provided to the client before treatment begins). During the treatment, learners will demonstrate consideration of a range of factors, including the following: techniques, client position, therapist's body position, legalities, adverse reactions, aftercare advice and contraindications (oral questioning may be used where appropriate to confirm understanding). Practical application of all sports massage techniques should be observed across the two sports massages performed. Supplementary evidence, in the form of video evidence or annotated photographs, will be required as evidence.

Learners will consider the reasons why and how the body and mind responds physiologically, mechanically and psychologically to each sports massage performed.

When conducting the sports massage, learners may show some nervousness or indecision when performing the treatment methods; however, correct application will be evident.

The written work may have occasional inaccuracies with regard to terminology and explanations; however, the information should be largely factually correct. Where appropriate, annotation such as diagrams and pictures is encouraged to support the learners' explanations.

Links to other units

This links to:

- Unit 1: Sport and Exercise Physiology
- Unit 2: Functional Anatomy
- Unit 3: Applied Sport and Exercise Psychology
- Unit 5: Applied Research Methods in Sport and Exercise Science
- Unit 6: Coaching for Performance and Fitness
- Unit 7: Biomechanics in Sport and Exercise Science
- Unit 8: Specialised Fitness Training
- Unit 9: Research Project in Sport and Exercise Science
- Unit 10: Physical Activity for Individual and Group-based Exercise
- Unit 13: Nutrition for Sport and Exercise Science
- Unit 15: Sports Injury and Assessment.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities.

This unit would benefit from employer involvement in the form of guest speakers.

Unit 12: Sociocultural Issues in Sport and Exercise

Level: **3**

Unit type: **Internal**

Guided learning hours: **60**

Unit in brief

This unit considers the value of sport and exercise in our society and the historical, social, cultural and ethical factors that impact on its development.

Unit introduction

You will gain an appreciation that sport is not just about fun, health and fitness, but that there is a political and commercial agenda that continues to manipulate sport for the advantages it can bring. Studying this unit will give you an insight into the reasons for the development of sport and why sport continues to hold such an important role in our society. You will learn about the sociological theories which underpin the study of sport and society, how sport can be used to address social and cultural issues and the relationships between sport, commercialism and the media.

This unit will give you a broad understanding of sport and its importance and forms a good basis for progression to higher education for further study of the role of sport in our society.

Learning aims

In this unit you will:

- A** Understand the social theories used to study and interpret sport and exercise in society
- B** Investigate the historical and cultural changes, and the social and ethical issues that have impacted on sport and exercise development in the UK
- C** Investigate the relationships between commercialism, the media, and sport and exercise.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Understand the social theories used to study and interpret sport and exercise in society	A1 Functionalist theory A2 Conflict theory A3 Critical theory A4 Figurational theory	A report that justifies the sociological theories used to interpret the role of sport in society.
B Investigate the historical and cultural changes, and the social and ethical issues that have impacted on sport and exercise development in the UK	B1 Historical and cultural changes on sport B2 Social and ethical issues in the UK	A report that includes an evaluation of the impact of historical, cultural and social issues on the development of sport and exercise in the UK.
C Investigate the relationships between commercialism, the media, and sport and exercise	C1 The use of media to promote sport C2 The impact of media attention on sport and sports figures C3 The impact of media attention on sports performers and spectators C4 Sport and the performer as a commercialised product C5 Globalisation of sport C6 Balance between social issues and the globalisation of sport	A report that evaluates the impact of the media and commercialisation on the development of sport and exercise.

Content

Learning aim A: Understand the social theories used to study and interpret sport and exercise in society

Learners must understand the social theories and the impact they may have in sports and exercise contexts.

A1 Functionalist theory

How sport and exercise contributes to society:

- develops character through teaching social norms and values
- encourages positive work ethic
- encourages individuals to get together to meet common values and goals
- integration across different social and cultural groups
- increases fitness and health of a nation.

A2 Conflict theory

How sport and exercise is used as a form of control:

- used by powerful groups for their own motives
- to entertain and control masses
- to promote capitalist growth
- to promote national pride.

A3 Critical theory

How sport and exercise can be used to bring about change:

- political involvement in sport
- use of sport as a means to change society
- educational messages through sport and exercise
- critical feminist theories that say sport is a gendered activity.

A4 Figurational theory

How sport and exercise reflects acceptable and unacceptable behaviour in society:

- the reduction of aggression and violence in modern sport, reflecting the reduction of aggression and violence in society
- the cathartic benefits of sport and exercise
- involvement of the law in sport
- growth in sport spectatorship
- football hooliganism.

Learning aim B: Investigate the historical and cultural changes, and the social and ethical issues that have impacted on sport and exercise development in the UK

B1 Historical and cultural changes on sport

- Urbanisation:
 - the move from agricultural to urban society
 - loss of space and time for the more traditional activities such as mob games.
- Effects of industrialisation on sport, leading to change in format and function:
 - impact of religion on sport
 - rational recreation and public school games
 - the development of physical education (PE)
 - athleticism
 - recreation, mass participation and sport for all
 - sport and exercise as a mechanism for social control.

B2 Social and ethical issues in the UK

Learners must understand how social and ethical issues are addressed through sport and exercise.

- Social issues.
- Crime:
 - offering alternative activities to crime
 - improving self-esteem
 - developing pride in the community
 - promoting inclusion for different social groups.
- Challenging all forms of discrimination:
 - racism, e.g. 'Kick It Out' campaign in football
 - sexism
 - disability.
- Promoting health through increased focus on the benefits of sport and exercise.
- Employment:
 - increased opportunity.
- Lottery funding.
- Participation initiatives:
 - promoting community cohesion
 - providing positive role models
 - community outreach programmes
 - local sports leagues/competitions.
- Ethical issues:
 - performer violence
 - performance-enhancing drugs
 - dysfunctional spectator behaviour
 - excellence and elitism
 - match fixing/spot-fixing
 - dispute resolution.

Learning aim C: Investigate the relationships between commercialism, the media, and sport and exercise

Learners must investigate the relationships which exist in sport and exercise due to the media and commercialism.

C1 The use of media to promote sport

- Types of media:
 - terrestrial, digital and satellite broadcasters, e.g. BBC, ITV, Sky Sports, BT Sport
 - radio, newspapers, magazines.
- New technologies used to cover sport:
 - social media, internet, apps.
- Role of the media:
 - to inform
 - to educate
 - to advertise/promote
 - to entertain
 - to provide public service announcements.
- Symbiotic relationship between sport and the media:
 - whose view the media is representing
 - public perception of meaning from the images and messages they receive.

C2 The impact of media attention on sport and sports figures

Impact on:

- the popularity of a sport or activity
- the perceived value of a sport or activity
- the quality of coverage given to a sport or activity
- the funding available to a sport or activity
- public education around a sport or activity
- participation figures
- encouraging trends in sports or activities
- spectator perceptions/expectations
- rule changes
- timing of events
- sports kits or uniforms
- facilities
- the number of/location of organised events
- niche sports.

C3 The impact of media attention on sports performers and spectators

- Impact on the performer:
 - increased pressure to perform well
 - invasion of private life
 - number of performances.
- Impact on spectators:
 - cost of following a team or individual performer
 - availability of events to spectate
 - quality of performance watched.
- Minority groups and the media:
 - promoting or reducing social inequality
 - promoting positive and negative role models.

C4 Sport and the performer as a commercialised product

- Sport as a product:
 - spectator events
 - admission fees
 - concession fees
 - media rights
 - merchandising
 - gambling
 - ethics of fair trade.
- The performer as a product:
 - use of performers in advertising and endorsement of products to increase sales
 - trading of performers between teams
 - foreign investment in UK sport.

C5 Globalisation of sport

- Conditions leading to globalisation.
- Collaboration between countries in relation to sport rules.
- Marketing, brand and commerce-related activities.
 - Movement of sports performers and spectators worldwide.
 - Environmental effects of sport.

C6 Balance between social issues and the globalisation of sport

- Investing in grassroots sport.
- Sponsorship at all levels of participation.
- Role of national governing bodies.
- Regeneration of brownfield sites.
- High-profile celebrities raising awareness, e.g. using sport to highlight charities and support local communities.
- Ethical sourcing of resources.
- Making use of legacies.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Understand the social theories used to study and interpret sport and exercise in society		A.D1 Justify the use of sociological theory in interpreting the role of sport and exercise in society.
A.P1 Explain a sociological theory and its impact on sport and exercise in society.	A.M1 Analyse the use of sociological theory and its impact on sport and exercise in society.	
Learning aim B: Investigate the historical and cultural changes, and the social and ethical issues that have impacted on sport and exercise development in the UK		B.D2 Evaluate the impact of historical, cultural, social and ethical issues on the development of sport and exercise in the UK.
B.P2 Explain how historical and cultural changes in the UK have impacted on sport and exercise.	B.M2 Analyse how historical and cultural changes in the UK have impacted on sport and exercise.	
B.P3 Explain how social and ethical issues in the UK have been addressed by sport and exercise.	B.M3 Analyse how social and ethical issues in the UK have been addressed by sport and exercise.	
Learning aim C: Investigate the relationships between commercialism, the media, and sport and exercise		C.D3 Evaluate the impact of the media and commercialisation on the development of sport and exercise as a global product.
C.P4 Explain the role of the media and commercialisation in the development of sport and exercise.	C.M4 Assess the impact of the media and commercialisation on the development of sport and exercise into a global product.	
C.P5 Explain how sport and exercise have become a global product.		

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of three summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim: A (A.P1, A.M1, A.D1)

Learning aim: B (B.P2, B.P3, B.M2, B.M3, B.D2)

Learning aim: C (C.P4, C.P5, C.M4, C.D3)

Further information for teachers and assessors

Resource requirements

There are no specific additional requirements for this unit.

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will produce a detailed analysis of how sport contributes to society and how it can be used to control and influence people's behaviours. Learners will give reasons to support how sociological theories are used to effectively interpret the role of sport in society. Learners will articulate their arguments coherently and will show that all sides have been carefully considered. Learners will include specific examples in their work, referencing theories with past and current views. For example, learners could refer to political involvement in sport and the critical theory view which implies that sport can be used to bring about change. Learners will use appropriate terminology and give examples to illustrate their points made throughout.

For merit standard, learners will produce a detailed and methodical examination of the use of sociological theory and its role in sport and exercise in society. Learners will give examples that demonstrate how the different theories are used to explain the role of sport in society. Learners will compare the different views and sociological theories and will be able to give current examples to interpret how sport is being used in society. Learners will give examples from a range of sports and activities to cement their arguments. For example, learners could refer to conflict theory (sport as a form of control), and give examples of how sport promoted national pride but may have also weakened it (perhaps through the outcome of the sporting event). Learners will use appropriate terminology throughout.

For pass standard, learners will give evidence to support an argument for the use of a sociological theory and its role in sport and exercise in society. Learners will demonstrate their understanding by using examples of a recent sporting event, applying sociological theory to explain its role in society. For example, learners may apply functionalist theory to any Paralympic Games and explain how the sporting event encouraged individuals to get together to meet common values and goals, promoting integration across different social and cultural groups. Learners will include examples from both competitive and non-competitive sports situations to explain their answers. For example, learners could apply conflict theory views to jogging or going to the gym to explain how these activities affect society.

Learning aim B

For distinction standard, learners will consider the significance of the impact of historical, social, cultural and ethical factors on the development and commercialisation of sport in the UK. Detailed evaluations will be made in relation to the interrelationships between each issue and the development of sport and exercise. Learners will consider the relationship between historical and cultural changes and sport in the UK and will include examples to support their arguments. For example, learners may look at an ethical issue in sport, such as spectator violence, and give examples of role models, how the sport has been used to address this issue and where historically the problem has arisen from. Learners will articulate their arguments coherently throughout.

For merit standard, learners will give a detailed and methodical examination of the historical and cultural changes to sport in the UK. They will consider the impact that these changes may have had on the development of sport and exercise. Learners will include examples to draw comparisons from the relationships between the historical and cultural changes and the provision of sport in the UK. Learners will use local sports examples to analyse how sport has been used in communities to address ethical and social issues. For example, learners may include the example of a local community outreach programme which has been set up to promote community cohesion by creating a sports league for the under 15s. Learners will use appropriate terminology and give examples to illustrate their points.

For pass standard, learners will give clear reasons to support the impact that historical and cultural changes have had on sport and exercise in the UK and how sport and exercise have been used to address social and ethical issues in the UK. They will consider the changes to society which have led to the sports and activities that we participate in today. Learners will give examples of sport and exercise activities which have been used to ease ethical issues, for example 'Sport for All' and mass participation. Learners will include historical examples as well as those from current society. Learners will demonstrate an understanding of ethical issues and be able to explain how sport can be used to address them.

Learning aim C

For distinction standard, learners will produce an evaluation of how the media and commercialisation have developed sport and exercise to make it a global product. Learners will draw on varied information to consider the strengths/weaknesses and the relevance/significance of key organisations and their impact on sport. Learners' evaluations will lead to a supported judgement on how the media and commercialisation have developed sport and exercise to make it a global product. Learners will include relevant examples which demonstrate the interrelationship between the media and commercialisation and the effects these have had on sport. Learners will include recommendations as to how the tensions arising from the globalisation of sport can be addressed.

For merit standard, learners will give a careful consideration of the role of the media and how it is used to promote sport. Learners will draw conclusions, supported by examples, demonstrating the impact of the media on sport, sports performers and spectators. Examples will be from a range of sports and exercise activities. Learners will include an analysis of the impact of the media and commercialisation on a sport and how sport has become a global product. For example, learners could look into a specific sport, the rules of their national governing body and how a collaboration between countries in relation to the sports rules has allowed it to be played globally, but has meant that some of the 'national' rules have changed during global competitions.

For pass standard, learners will give arguments to support the impact of the media and commercialisation on the development of sport and exercise. Learners will include examples of sport and exercise activities to be able to explain how sport and exercise have become a global product. Learners' explanations will show reasons and/or evidence to support an opinion and will show that they comprehend the subject area. For example, learners could discuss the impact of the media on a selected sport, for example football, and explain how kick-off times have changed and some rules have been altered to make the sport better for TV. This could then lead to an explanation of how this sport has become commercialised and what this has meant for the sport, players and spectators.

Links to other units

This unit links to:

- Unit 3: Applied Sport and Exercise Psychology
- Unit 5: Applied Research Methods in Sport and Exercise Science
- Unit 9: Research Project in Sport and Exercise Science
- Unit 14: Technology in Sport and Exercise Science.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit.

Unit 13: Nutrition for Sport and Exercise Performance

Level: **3**

Unit type: **External**

Guided learning hours: **120**

Unit in brief

Learners will gain a broad understanding of the importance of nutrition and hydration to be able to adapt a nutritional programme for a variety of sports participants.

Unit introduction

In this unit, you will understand how nutrition can positively or negatively affect a sports participant's performance, the importance of hydration, and how to apply the nutritional principles needed to meet a specific athlete's nutritional requirements. You will focus on the concepts of nutrition and digestion and the components of a balanced diet. You will explore the importance of micronutrients and macronutrients, hydration and the factors affecting digestion and absorption of water.

You will investigate the sporting demands of performers and how nutritional requirements will vary for each individual. Rigorous training and competition schedules linked to the recovery process can have a considerable effect on performance. This will develop your understanding of energy requirements and expenditure for a variety of different sports and events.

Learners will identify the influencing factors directly linked to energy input and output, including gender, age, climate and physical activity. Learners will be able to apply knowledge and understanding by adapting a realistic diet and hydration plan for selected athletes or sports performers, including justifications for their nutritional guidance.

Summary of assessment

This unit will be assessed through a single part written task set and marked by Pearson.

The supervised assessment period is a maximum of three hours in a single session. Learners will complete and submit a set task based on a case study which will focus on an individual that requires guidance on nutrition in response to their personal and training needs that are impacting on their performance. The set task will assess their ability to interpret, modify and adapt a nutritional programme for a given scenario.

Please see *Issue 2* of the Sample Assessment Material to help prepare learners for assessment.

The number of marks for both versions of the task is 50.

The assessment availability is December/January and May/June each year.

Assessment outcomes

AO1 Demonstrate knowledge and understanding of nutritional principles, strategies and concepts

AO2 Apply knowledge and understanding of nutritional principles, strategies and concepts to sport and exercise performance in context

AO3 Analyse and evaluate information and data relating to an individual's needs in order to determine modifications and guidance to improve sport and exercise performance

AO4 Be able to develop and adapt a nutritional programme in context and with appropriate justification

Essential content

The essential content is set out under content areas. Learners must cover all specified content before the assessment.

A Principles of nutrition and hydration

Understand basic nutritional principles and their effect on the body's ability to function in sport and exercise performance.

A1 Basic nutritional principles

- Nutritional measurements and units:
 - calories (cal)
 - kilocalories (kcal)
 - joules (j)
 - kilojoules (kj).
- Recommended daily allowance (RDA).
- Metabolism.
- Basal metabolic rate (BMR).
- Harris–Benedict equation (to calculate BMR).
- Effect of activity level on BMR.
- Energy balance:
 - energy expenditure
 - energy intake
 - energy intake versus energy expenditure.
- Physical activity:
 - calories used in different activities (intensity and length of time).
- Body composition:
 - body mass index (BMI)
 - bioelectrical impedance analysis (BIA).

A2 Macronutrients

Understand the different food groups, their functions and how the body uses them.

- Carbohydrates:
 - monosaccharides
 - disaccharides
 - polysaccharides
 - sources
 - recommended daily amounts (RDA)
 - glycaemic index (GI).
- Fats:
 - saturated
 - monounsaturated
 - polyunsaturated
 - trans-unsaturated
 - sources
 - recommended daily amounts (RDA).
- Proteins:
 - essential
 - non-essential
 - sources
 - recommended daily amounts (RDA).

- Function of each macronutrient.
- Energy content of macronutrients:
 - 1 g protein provides 4 kcal or 17 kj
 - 1 g carbohydrate provides 4 kcal or 16 kj
 - 1 g fat provides 9 kcal or 37 kj.

A3 Micronutrients

- Vitamins.
- Fat soluble:
 - vitamin A
 - vitamin D
 - vitamin E
 - vitamin K.
- Water soluble:
 - vitamin B
 - vitamin C.
- Minerals:
 - calcium
 - iron
 - sodium
 - salt (sodium chloride).
- Recommended daily intake (RDI).
- Function of each micronutrient.
- Deficiency of each micronutrient.

A4 Fibre

- Function of fibre.
- Source of fibre.
- Recommended daily intake (RDI).

A5 Fluid intake

Understand the importance of fluid intake to maintain hydration.

- Function maintaining hydration levels:
 - thermoregulation
 - maintain optimal sports performance.
- Types of fluid:
 - isotonic
 - hypertonic
 - hypotonic
 - function of each type of fluid.
- Effects of temperature of fluid on speed of rehydration.
- Effects of carbonated fluid on time to rehydrate.
- Recommended daily intake (RDI):
 - factors affecting RDI – climate, activity level.
- Effects of dehydration (hypernatremia).
- Effects of hyperhydration (hyponatremia).

B Factors affecting digestion and absorption of nutrients and fluids

B1 Basic principles of digestion

- Functions:
 - breakdown of food
 - absorption of nutrients and fluids
 - excretion of waste products.
- Timing of digestion of different macronutrients.
- Timing of absorption of different types of fluids.
- Redistribution of blood flow during digestion.

B2 Hormonal control of blood sugar and water balance

- Hormonal control of blood sugar levels.
- Low levels of blood sugar:
 - pancreas releases glucagon
 - sugar is released from the glycogen stores in the liver and muscle into the bloodstream to increase blood sugar levels.
- High levels of blood sugar:
 - pancreas (islets of Langerhans) releases insulin
 - sugar is removed from the blood by the liver and stored as glycogen or fat.
- Hormonal control of water balance.
- Dehydration:
 - pituitary gland releases antidiuretic hormone (ADH)
 - more water is reabsorbed into the blood via the kidneys.
- Hyperhydration:
 - pituitary gland no longer releases ADH
 - less water is reabsorbed by the kidneys and more water is excreted by the body.

B3 Control of glycogen synthesis

- Types of food to maximise glycogen synthesis.
- Timing of food intake to maximise glycogen synthesis.

C Nutritional intake for health and wellbeing

C1 Balanced diet for health and wellbeing

- Balance of food groups:
 - grains
 - fruit and vegetables
 - protein
 - dairy
 - fats and sweets.
- Food pyramid.
- Eatwell plate.
- Impact of food preparation on the nutritional composition of food:
 - raw
 - boiled
 - steamed
 - grilled
 - fried/roasted
 - baked
 - cured
 - processed
 - juiced.

C2 Benefits of a balanced diet

- Weight maintenance.
- Reduced risk of chronic disease – type II diabetes, osteoporosis, coronary heart disease, cancer.

C3 Eating disorders

Definition of eating disorders and effect on health.

- Anorexia nervosa.
- Bulimia nervosa.
- Overeating.

D Nutritional strategies for sports performance

D1 Nutritional strategies based on the demands of different sports

- Nutritional strategies:
 - carbohydrate/glycogen loading
 - increased protein intake
 - weight loss
 - weight gain.
- Application of nutritional strategies for different sporting events:
 - endurance event
 - strength/power event
 - to meet/maintain a target weight category.

D2 Supplements to support nutritional strategies

- Effect on the body and health, and benefits to sporting performance:
 - caffeine
 - creatine
 - energy gels/glucose tablets
 - protein shakes/powders
 - beetroot juice
 - diuretics
 - vitamin supplements
 - branched-chain amino acids (BCAA).
- Nutritional supplements and competition regulations according to World Anti-Doping Agency (WADA):
 - quantities permitted in training and competition
 - banned substances.

D3 Nutritional intake during different phases of event

- Phases of event:
 - pre-event
 - during event
 - post-event.
- Types of food to be consumed during each phase.
- Timings of food intake.
- Fluid intake.
- Supplements where appropriate.

Grade descriptors

To achieve a grade a learner is expected to demonstrate these attributes across the essential content of the unit. The principle of best fit will apply in awarding grades.

Level 3 Pass

Learners will be able to modify a programme for an individual that demonstrates knowledge and understanding of nutrition and fluid intake relevant to the requirements in the context. They will show an understanding of the health and wellbeing requirements of the individual, and will be able to apply relevant nutritional principles and strategies to the scenario. They will identify the impact of factors affecting the digestion and absorption of nutrients and fluids. Learners will be able to provide guidance and justify proposed adaptations/modifications to the nutritional programme which are appropriate to the individual, and realistic in the context of the specified sporting event and phase of activity.

Level 3 Distinction

Learners will be able to modify a programme for an individual that demonstrates thorough knowledge and understanding of nutrition and fluid intake relevant to the requirements in the context, supported by justification. They will show a detailed understanding of the health and wellbeing requirements of the individual, and apply specific nutritional principles and strategies entirely relevant to the scenario. They will demonstrate an analytical approach to the identification of factors which will impact on the digestion and absorption of nutrients and fluids and will justify actions to overcome these factors. Learners will provide guidance and recommendations which will contain sustained lines of argument leading to a cohesive nutritional programme that is entirely appropriate to the individual, and realistic in the context of the specified sporting event and phase of activity.

Key terms typically used in assessment

The following table shows the key terms that will be used consistently by Pearson in its assessments to ensure students are rewarded for demonstrating the necessary skills.

Please note: the list below will not necessarily be used in every paper/session and is provided for guidance only.

Command or term	Definition
Adaptations	Any alteration in the structure or function of something.
Function	An act, process, or series of processes that serve a purpose.
Guidance	Advice or information aimed at resolving something.
Interpretation	Learners are able to draw the meaning, purpose or qualities of something from a stimulus.
Justification/rationalisation	Learners give reasons or evidence to: <ul style="list-style-type: none"> • support an opinion and/or decision • prove something right or reasonable.
Modify	To make partial or minor changes to something.

Command or term	Definition
Phase of event	A distinct stage of a sporting event.
Recommend	Learners put forward (someone or something) with approval as being suitable for a particular purpose or role.
State	Give a definition or example. Give an answer to a calculation.
Strategies	Method or plan to bring about a desired outcome, such as the achievement of a goal or a solution to a problem.

Links to other units

This unit links to:

- Unit 1: Sport and Exercise Physiology
- Unit 2: Functional Anatomy
- Unit 6: Sports Coaching for Performance
- Unit 8: Specialised Fitness Training
- Unit 10: Physical Activity for Individual and Group-based Exercise
- Unit 11: Sports Massage
- Unit 15: Sports Injury and Assessment.

Employer involvement

Centres may involve employers in the delivery of this unit if there are local opportunities.

This unit would benefit from employer involvement in the form of guest speakers.

Unit 14: Technology in Sport and Exercise Science

Level: **3**

Unit type: **Internal**

Guided learning hours: **60**

Unit in brief

This unit covers the use of technology in sport and exercise, its impact on performance, the measurement of performance, and the ethical considerations associated with its use.

Unit introduction

Technology is used by sports performers of all levels to maximise their potential and enhance their experience. Therefore, understanding the use and impact of technology in sport and exercise is extremely important to any sports scientist, coach or performer.

In this unit, you will examine the impact of technology on sport and exercise. You will explore the types of technology and personal equipment available to sport and exercise performers and investigate how technology aids sport and exercise performance. You will then explore how technology is used to measure and analyse sport and exercise performance. Finally, you will examine the ethical considerations that impact on the use of technology in sport and exercise.

These studies will help you gain knowledge and understanding of the appropriate technologies used across a range of sporting activities, preparing you for a variety of careers in the sports industry and forming a good basis for higher education study in sport and further qualifications in sport and exercise science.

Learning aims

In this unit you will:

- A** Investigate technology to aid sport and exercise performance
- B** Explore technology to develop sport and exercise performance
- C** Understand the ethics of using technology in sport.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Investigate technology to aid sport and exercise performance	A1 Types of technology used in sport A2 Technology that is worn by the sports performer A3 Personal equipment that is used by the performer A4 Facilities that are used by the sports performer A5 Reason for selection of sports technology	A presentation that evaluates the impact of personal technology equipment and sporting environments on sporting performance.
B Explore technology to develop sport and exercise performance	B1 Technology for data collection B2 Technology for performance analysis B3 Technology for simulated conditions	A report that evaluates the impact of technology and the resulting data collection on sports performance.
C Understand the ethics of using technology in sport	C1 Ethics of the development of technology used in sport C2 Ethics of the use of technology in sport	A report that evaluates the impact of the ethics of using technological advancements in sports training and competitions.

Content

Learning aim A: Investigate technology to aid sport and exercise performance

A1 Types of technology used in sport

- Wearable technology, e.g. clothing and footwear.
- Personal equipment – used to help performance, but not a requirement of the activity, e.g. goggles, sunglasses, Global Positioning System (GPS) tracking.
- Equipment – used to perform skills within the sport, e.g. bats, balls, clubs, racquets, bicycles.
- Facilities, e.g. surfaces, protection from weather conditions.
- Benefits of technology use:
 - increases sport performer's speed, strength, protection, time in their sport/event
 - increased recovery time
 - simulated competition conditions
 - enables the performer to maximise their own physical performance
 - increased safety for participants and spectators.

A2 Technology that is worn by the sports performer

Learners should investigate a technology that sports performers wear during a wide range of sports and activities.

- Technical clothing – purpose:
 - to keep the performer dry and warm, lightweight and breathable insulation composed of densely woven synthetic fibres, designed to keep athletes dry and comfortable
 - to reduce resistance, e.g. swimming skinsuit
 - to give the performer biofeedback, e.g. intelligent textiles and smart garments that include embedded sensors and on-board computers for biofeedback.
- Properties of technical clothing:
 - materials, function, strength, protection, e.g. motorsport racing suit evolution, fluorescent materials incorporated into clothing, compression clothing/guards, grip bubbles on shirts, glove technology, skinsuit technology.
- Sporting footwear – purpose:
 - increased grip
 - reduced friction
 - for gait analysis
 - cushioning to reduce impact injuries
 - to match activity requirements
 - increased skill levels, e.g. football boot design (studs, style of boot).
- Properties of the footwear:
 - materials, comfort, weight, flexibility, waterproofness, hardwearing.

A3 Personal equipment that is used by the performer

Technology that the sports person uses to help their performance, but which is not a requirement of the sport/activity. Learners should examine the technology's purpose and usefulness to sports performance.

- Supports, braces, splints.
- Sunglasses, goggles.
- Heart rate monitors, blood pressure monitors.
- GPS tracking devices.
- Pedometers.
- Magnetic bracelets/necklaces.
- Fitness bands/fitness trackers, e.g. FitBit®, vivosmart®.

A4 Facilities that are used by the sports performer

Learners should consider the facilities used during training and sports performance.

- Types of facilities:
 - controlled climates – simulated weather conditions, heat/cold, altitude, humidity, lighting
 - hypobaric chambers
 - indoor training facilities – indoor turf
 - climbing walls
 - all weather terrains
 - indoor skydiving (wind tunnels/turbines)
 - snow domes
 - artificial playing surfaces, e.g. 'i-pitch' ('intelligent pitch').
- Development of facilities:
 - changes to existing structures, e.g. Wimbledon Centre Court
 - new building design, e.g. Lee Valley (London 2012) Velodrome, London Aquatics Centre
 - manmade environments, e.g. Holme Pierrepont Country Park.
- Benefits of facility use:
 - all weather access
 - 24-hour access, e.g. facilities can be shared, not limited to daylight
 - simulated climatic conditions
 - no geographical restrictions
 - safer environments for performance, training and rehabilitation.

A5 Reason for selection of sports technology

Learners should examine why equipment has changed and how it is developed by using technology.

- Performance-based reasons:
 - drag reduction, e.g. cycling helmets
 - increased power production, e.g. racket and string design, golf club design
 - increased protection, e.g. helmet design changes, gumshield design, scrum cap design
 - money, e.g. reduced costs of equipment
 - improved materials, e.g. graphite poles in pole vault improving durability and performance
 - sponsorship, e.g. funding new technology research and development, funding the costs of equipment to performers
 - collection of usable performance data.
- Injury:
 - injury prevention and recovery aids, e.g. supports, braces, splints
 - improving rehabilitation.
- Sporting traditions.
- Improving competition, e.g. FIFA Women's World Cup played on new-technology artificial 4G pitches.

Learning aim B: Explore technology to develop sport and exercise performance

B1 Technology for data collection

- GPS technology:
 - used in training to measure distance covered, speed, acceleration, deceleration.
- Video analysis.
- Force platforms.
- Accelerometers.
- Timing lights.
- Radar guns.
- Timing technology:
 - laser beams and photocells to monitor starts and finishes
 - contact pads containing accelerometers in swimming.

B2 Technology for performance analysis

- Performance analysis technologies.
- Video analysis technology, e.g. Dartfish®.
- Focus performance innovation.
- Prozone™.
- Application software:
 - heart rate monitor
 - Ski Tracks
 - Fitness Buddy
 - BodyByte®
 - EyeVision (replay system).

B3 Technology for simulated conditions

Learners explore the use of computer simulation technologies.

- Virtual replay technology and ball tracking systems, e.g. Hawk-Eye in cricket and tennis.
- Indoor golf simulators.
- Virtual GT motorsports simulator.
- Dawn simulators.

Learning aim C: Understand the ethics of using technology in sport

C1 Ethics of the development of technology used in sport

- Developments in technology.
- Cost of the development and use of technology.
- Fairness of using technology in competitive situations.
- Equality of different technologies.
- Ethical barriers to the use of technology.
- Governing body regulations on the use of technology.

C2 Ethics of the use of technology in sport

- Sources of funding and accessibility of them.
- Sources of sponsorship and accessibility of them.
- Cost of equipment/technology.
- Availability of equipment.
- Availability/access to technology.
- Facilities – geographical differences in availability, e.g. north and south, heavily populated areas and rural areas.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Investigate technology to aid sport and exercise performance		A.D1 Evaluate the impact of personal sports equipment and sporting environments on sporting performance.
A.P1 Explain how technology impacts on personal sports equipment.	A.M1 Analyse how technology impacts on the selection of personal sports equipment and sporting environments.	
A.P2 Explain how technology impacts on sporting environments.	A.M2 Analyse how the selection of personal sports equipment may impact on performance.	
Learning aim B: Explore technology to develop sport and exercise performance		B.D2 Evaluate the impact of technology on the development of sport and exercise performance.
A.P3 Explain the reasons behind the selection of personal sports equipment and sporting environments.		
B.P4 Discuss how technology is used to develop sport and exercise performance.	B.M3 Analyse the use of technology to develop sport and exercise performance.	C.D3 Evaluate how ethics impacts on the use of technological advancements in sports training and competitions.
Learning aim C: Understand the ethics of using technology in sport		
C.P5 Explain how ethics impacts on the use of technology in training and competition situations.	C.M4 Analyse how ethics impacts on the use of technology in training and competition situations.	

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of three summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim: A (A.P1, A.P2, A.P3, A.M1, A.M2, A.D1)

Learning aim: B (B.P4, B.M3, B.D2)

Learning aim: C (C.P5, C.M4, C.D3)

Further information for teachers and assessors

Resource requirements

There are no specific additional requirements for this unit.

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will produce a detailed evaluation of the impacts of personal technology equipment and sporting environments on sporting performance. Learners will articulate their arguments coherently and will show that all sides have been carefully considered. Learners will include specific examples in their work, referencing different types of technology selected by sportspeople in a range of sport and exercise activities. Learners will use appropriate terminology and give examples to illustrate their points throughout.

For merit standard, learners will produce a methodical and detailed examination of the impact of personal sports equipment selection on sports performance. Learners will give examples that demonstrate how sportspeople in a range of sport and exercise activities chose technology to help enhance their performance. Learners will compare the different types of technology and analyse which are the most appropriate in terms of cost and availability. Learners will give examples of facilities, environments, wearable technology and equipment. Learners will use appropriate terminology.

For pass standard, learners will give clear reasons as to how personal sports equipment technology and sporting environments impact on sports performance. Learners will then develop their work by explaining why selecting the most appropriate personal sports equipment and sporting environments can affect sports performance. Learners will show consideration of the reason for the equipment selection. Learners will include examples of the impacts of cost, availability and trends in technology.

Learning aim B

For distinction standard, learners will consider the significance of the impact of technology on the development of sports performance. Learners will draw conclusions, based on an examination of the strengths and weaknesses, or advantages and disadvantages, of using technology to collect data, analyse performance and simulate conditions. Learners will demonstrate knowledge of the different types of technology used for each purpose that is appropriate for specific sports, activities and events. Learners will give relevant examples from a range of sports and exercise activities to support their conclusions. Learners will use appropriate terminology and give examples to illustrate their points throughout.

For merit standard, learners will present a detailed and methodical examination of the use of technology to develop sports performance. Learners will consider the key interrelationships between the technology used to collect data, analyse performance and simulate conditions, and the development of sports performance itself. Learners will support their examination using appropriate examples of technology for each purpose. Learners will use appropriate terminology throughout.

For pass standard, learners will consider how technology is used to develop sport and exercise performance. They will explore the interrelationships between the performance developments required and the type(s) of technology used. Learners will include a range of examples from sport and exercise activities that demonstrate the use of technology for the purposes of collecting data, analysing performance and simulating conditions. Learners will demonstrate a clear understanding of how sport and exercise performers can use these technologies to improve their own sport or exercise performance.

Learning aim C

For distinction standard, learners will produce a detailed evaluation of the ethics of using technology in sport and exercise activities. Learners will justify the use of technology and its fairness in sport. For example, learners may give examples of the cost of a type of technology used in a sport or exercise activity and explore whether this makes the sport elitist, as only those who can afford the better technology can succeed. Learners will detail both sides of their arguments and make suggestions as to how any ethical issues brought about by the use of technology in sport can be addressed. Learners will use appropriate terminology and give examples to illustrate their points throughout.

For merit standard, learners will produce a detailed and methodical examination of how ethics impacts on the use of sport and exercise technology in training and competition situations. Learners will consider the ethical barriers to the use of technology and the governing body regulations on the use of technology in a selected sport. Learners will give examples of how the cost of equipment/technology could be met by funding or sponsorship. Learners will demonstrate their understanding of the ethics associated with sponsorship and accessibility to technology. Learners will use appropriate terminology throughout.

For pass standard, learners will give reasons to support the impact of ethics on the use of technology in training and competition situations. Learners will give examples which show current developments in technology. Learners will be able to identify the ethics of using the technology, for example the cost of the technology and the fairness of doing so in competition. Learners will be able to explain the ethics of funding and sponsorship by including examples of sources of sponsorship and funding and the availability of technology.

Links to other units

This unit links to:

- Unit 4: Field and Laboratory-based Fitness Testing
- Unit 6: Coaching for Performance and Fitness
- Unit 7: Biomechanics in Sport and Exercise Science
- Unit 8: Specialised Fitness Training
- Unit 9: Research Project in Sport and Exercise Science
- Unit 10: Physical Activity for Individual and Group-based Exercise
- Unit 12: Sociocultural Issues in Sport and Exercise
- Unit 15: Sports Injury and Assessment.

Employer involvement

This unit would benefit from employer involvement in the form of:

- provision of guest speakers
- participation in audience assessment of presentations
- opportunities to visit suitable businesses.

Unit 15: Sports Injury and Assessment

Level: **3**

Unit type: **Internal**

Guided learning hours: **60**

Unit in brief

Learners study the signs and symptoms of sports injuries, application of basic treatment and rehabilitation methods, injury risk factors and injury prevention.

Unit introduction

For personnel involved in any aspect of sport science, the incidence of experiencing or witnessing an injury is common. Depending on your role in the sporting environment, an appreciation and understanding of sports injuries and their symptoms is essential to ensure appropriate treatment is administered. Injury prevention is vital to reduce the risk of injury and can be achieved by understanding the mechanism of injury, the role of biomechanics and effective preventative measures. For those participants who are suffering an injury, effective treatment may result in a quicker return to their chosen activity or onto rehabilitation.

In this unit, you will learn how to differentiate between acute and chronic injuries, understanding injury mechanisms, appreciating the types of injury that may be experienced in each classification, and gaining an awareness of the aetiology and symptoms that can present for each injury. You will recognise the symptoms of injury and understand the physiological and psychological responses to injury and rehabilitation. This will assist your ability to make an informed decision regarding treatment at the time of injury, including necessary assistance that needs to be summoned. You will be able to confidently and effectively apply first-aid techniques and common treatment methods such as PRICE and SALTAPS and develop a functional rehabilitation programme. Finally, you will be able to minimise the risk of injury and remove any factors which may predispose a person to injury. You will understand gait analysis and the components of the sequence of prevention model, and introduce preventative measures in order to reduce risk and prevent injury occurrence.

These activities will prepare you for a variety of careers in the sport and exercise science sector. Although this unit is not designed to develop you into an accomplished sports therapist, you will be able to act appropriately in response to sports injuries. This unit will form a good basis for aspects of higher education study in sport science and sport and exercise science-related qualifications.

Learning aims

In this unit you will:

- A** Understand acute and overuse injuries, their associated signs and symptoms and mechanism of injury
- B** Examine the physiological and psychological responses to injury and rehabilitation
- C** Investigate aetiology of sports injuries and their associated prevention strategies
- D** Explore common treatment and rehabilitation methods.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Understand acute and overuse injuries, their associated signs and symptoms and mechanism of injury	A1 Acute injuries A2 Overuse injuries A3 Mechanisms of injury	An evaluative report focusing on acute and overuse injuries, including signs, symptoms and examples of mechanisms of injury. An evaluation of a range of mechanisms for sports injuries and physiological and psychological response to injury and rehabilitation, with use of specific examples, will also be evident.
B Examine the physiological and psychological responses to injury and rehabilitation	B1 Physiological response to injury B2 Psychological response to injury B3 Psychological factors associated with sports injury rehabilitation adherence	
C Investigate aetiology of sports injuries and their associated prevention strategies	C1 Aetiology and prevention C2 Gait analysis C3 Preventative measures	A presentation focusing on intrinsic and extrinsic risk factors, gait analysis and the addressing of prevention and treatment of injury, as well as an analysis of the sequence of prevention model.
D Explore common treatment and rehabilitation methods	D1 Treatment methods and the need for medical referral D2 Principles of rehabilitation D3 Methods of rehabilitation	<p>Effective and confident practical application of a range of common treatment methods, and oral questioning with regard to medical referral in response to given case study scenarios.</p> <p>Development of a rehabilitation programme in response to a given case study scenario and a written report justifying the programme.</p> <p>A report focusing on the importance of sports injury management to sports performers.</p>

Content

Learning aim A: Understand acute and overuse injuries, their associated signs and symptoms and mechanism of injury

Injuries should be discussed with regard to mechanisms of injury and signs and symptoms, making reference to specific sporting examples.

A1 Acute injuries

The common signs and symptoms specific to each injury should be addressed in addition to general signs of acute injury.

- Bone – fractures, e.g. transverse, oblique, spiral and comminuted.
- Articular cartilage:
 - osteochondral
 - meniscal tear.
- Joint:
 - dislocation
 - subluxation.
- Ligament sprain/tear – grade I, II, III.
- Muscle strain/tear – grade I, II, III.
- Haematoma – inter and intra.
- Cramps.
- Acute compartment syndrome.
- Tendon:
 - partial and complete tear
 - tendonitis (tendonitis should be discussed with regard to the wider research evidence in conjunction with tendinosis, tendinopathy, mechanism and stages of injury).
- Bursa – traumatic bursitis.
- Skin:
 - abrasions
 - lacerations
 - puncture wounds
 - contusions.

A2 Overuse injuries

- Bone:
 - stress fracture
 - osteitis
 - apophysitis.
- Articular cartilage – chondropathy.
- Joint:
 - synovitis
 - osteoarthritis.
- Ligament – inflammation.
- Muscle:
 - chronic compartment syndrome
 - muscle focal thickening.

- Tendon:
 - tendinopathy including tendonitis
 - tendinosis
 - paratenonitis
 - tenosynovitis.
- Bursa – bursitis.
- Skin:
 - blister
 - callus.

A3 Mechanisms of Injury

Mechanisms of injuries should be discussed with regard to the role of biomechanics using specific sports injury examples.

- Kinematics – a description of movement without reference to the forces involved.
- Five primary variables:
 - timing of the movement
 - position or location
 - displacement
 - velocity
 - acceleration – increase in magnitude usually results in increase in severity of injury.
- Kinetics – assessment of movement with respect to forces involved.
- Forces:
 - gravity
 - ground action forces
 - impact of objects
 - compression forces exerted on long bones in lower extremities
 - ligament forces acting on joints
 - musculotendinous forces
 - Newton’s laws.
- Consideration of external force (load):
 - how
 - where
 - direction
 - time period for application
 - how often
 - constant or varied
 - how quickly applied
 - tissue deformation.
- Rotation injuries:
 - mass
 - inertia
 - torque.

Learning aim B: Examine the physiological and psychological responses to injury and rehabilitation

B1 Physiological response to injury

The phases during the physiological response to injury should be discussed in relation to acute and overuse injuries using specific examples.

- Phase 1 – The inflammatory phase:
 - length of time
 - physiological responses
 - main functions
 - signs and symptoms – pain, swelling, redness, heat, loss of function.
- Phase 2 – The proliferative (tissue formation) phase:
 - length of time
 - physiological responses
 - main functions
 - signs and symptoms.
- Phase 3 – The maturation (remodelling) phase:
 - length of time
 - physiological responses
 - main functions
 - signs and symptoms.

B2 Psychological response to injury

Psychological responses should be considered in the context of response to injury and response to treatment and rehabilitation.

- Grief response model:
 - denial
 - anger
 - bargaining
 - depression
 - acceptance.
- Cognitive appraisal model:
 - personal factors
 - situational factors
 - cognitive appraisal
 - emotional response
 - behavioural response (Brewer 1994).
- Three categories of response:
 - injury-relevant information processing stage
 - emotional upheaval and reactive behaviour stage
 - positive outlook and coping stage.
- Stress injury model (Williams and Andersen 1998).
- Integrated model (Wiese-Bjornstal 1998).
- Stress response:
 - cognitive appraisal
 - physiological changes
 - attentional changes.

B3 Psychological factors associated with sports injury rehabilitation adherence

- Psychological/social factors affecting rehabilitation:
 - personal factors, e.g. pain tolerance, mental toughness, self-motivation, independence
 - situational factors, e.g. belief, process and procedures, environment, social support.

- Psychological techniques used to enhance rehabilitation adherence:
 - goal setting
 - motivational interviewing
 - social support
 - education
 - imagery
 - self-talk.
- Coping resources:
 - avoidance coping
 - emotion-focused coping
 - problem-focused coping
 - stress management skills.
- Psychological factors associated with the return to sport:
 - physical stressors
 - social stressors
 - performance stressors.

Learning aim C: Investigate aetiology of sports injuries and their associated prevention strategies

Intrinsic and extrinsic risk factors to injury should be discussed in relation to the predisposition to acute and overuse injuries. Specific examples should be used.

C1 Aetiology and prevention

- Intrinsic risk factors:
 - muscular – muscle imbalance, muscle weakness, leg length discrepancy
 - lack of flexibility – generalised muscle tightness, focal areas of muscle thickening, restricted range of movement
 - individual variables – age, fitness level, growth and development, gender, size, body composition, previous injury history
 - postural defects – lordosis, kyphosis, scoliosis
 - malalignment – pes planus, pes cavus, rearfoot varus, tibia vara, genu valgum, genu varum, patella alta, femoral neck anteversion, tibial torsion
 - psychological factors – history of stressors, personality characteristics (locus of control, competitive trait anxiety, resilience, risk taking), achievement motivation, poor coping resources, personal factors.
- Extrinsic risk factors:
 - training errors – excessive volume, excessive intensity, rapid increase, sudden change in type, excessive fatigue, inadequate recovery, faulty technique
 - coaching – poor coaching/leadership, communication, ensuring adherence to rules (foul play) and governing body guidelines
 - incorrect technique – lifting and handling equipment
 - environmental factors – conditions, e.g. hot and cold, humid, wet; surfaces, e.g. hard, soft, cambered; weather effects on surfaces, e.g. slipperiness
 - clothing and footwear – protective clothing and equipment, sports-specific, shoes, e.g. appropriateness (design/material, soles, size), worn out
 - safety hazards – importance of safety checks, environment safety checks, equipment checks, pitch inspections, safety checklists and records, risk assessments
 - misuse of equipment
 - inadequate nutrition and hydration
 - social factors – attitudes and influences of coaches and team managers.

C2 Gait analysis

Abnormal biomechanics associated with gait are often the cause of non-traumatic injury, and therefore understanding normal gait and abnormal gait allows for injury prevention.

- Walking gait:
 - stance phase (contact, midstance, propulsive)
 - swing phase (follow through, forward swing, foot descent)
 - double support phase.
- Running gait:
 - stance phase
 - swing phase
 - flight phase.
- Factors to consider:
 - duration
 - motion
 - position
 - how change in speed affects change in gait
 - footwear.
- Gait abnormalities:
 - pronation supination
 - pelvic tilts.
- Structural abnormalities:
 - forefoot varus
 - forefoot valgus
 - rearfoot varus
 - rearfoot valgus
 - bow legs
 - knock knees.
- Associated lower limb injuries:
 - plantar fasciitis
 - Achilles tendinopathy
 - medial shin pain
 - patellar tendinopathy
 - patellofemoral pain
 - stress fracture
 - hamstring strain
 - Iliotibial band syndrome (ITBS)
 - calcaneal bursitis
 - blisters
 - bruising.
- Footwear:
 - referral for orthoses
 - common footwear considerations, e.g. strength of midsole, calcaneal cradling, sufficient padding, general fit.

C3 Preventative measures

Principles of injury prevention

The sequence of prevention model for sports injuries (Van Mechelen et al. 1992 or Van Tiggelen et al. 2008) should be introduced as a framework which can be applied to reduce the incident of injury.

A research-based approach to fulfilling information requirements for steps 1 and 2 will be required, with the identification and justification of preventative measures in step 3.

Limitations should be understood with regard to the actual implementation of preventative measures in step 3, and in assessing the effectiveness of the introduction of any preventative measures in step 4, as methods of assessment cannot be addressed.

Preventative measures (stage 3 principle)

- Role of the coach:
 - up-to-date knowledge of sport/performer
 - qualifications
 - adapt coaching style to performer's ability/age/fitness level
 - communication.
- Equipment and environment:
 - checking equipment
 - risk assessments
 - appropriate surfaces
 - protective equipment
 - sport-specific equipment
 - assessment of environment conditions.
- Performer preparation:
 - warm-up/cool-down
 - stretching
 - sports massage.
- Appropriate training:
 - principles of training
 - training methods
 - strength and conditioning
 - core stability.
- Correction of biomechanical abnormalities:
 - referral to strength and conditioning coach
 - core stability
 - stretching
 - referral to podiatrist for shoe modification
 - leg length
- Other measures:
 - taping and bracing
 - nutrition
 - adequate recovery
 - psychological intervention.

Learning aim D: Explore common treatment and rehabilitation methods

D1 Treatment methods and the need for medical referral

Practical application of common treatment methods should be explored to allow confident and effective application.

- First aid:
 - primary and secondary survey
 - emergency/immediate treatment (priorities, resuscitation, shock, bleeding, unconscious casualty, fractures, prevention of infection, summon qualified assistance)
 - risk assessment
 - accident reporting procedures/form.
- PRICED:
 - protect
 - rest
 - ice
 - compression
 - elevation
 - diagnosis by professional.
- SALTAPS:
 - stop
 - ask
 - look
 - touch
 - active
 - passive
 - strength.
- Other treatments:
 - taping
 - bandaging
 - sling
 - splints
 - cryotherapy (use of ice)
 - the Lewis hunting reaction
 - thermal therapy (use of heat)
 - hot/cold therapy.
- Medical referral: for each of the following personnel or departments identified below, understanding is required of when they should and shouldn't be used for medical referral (www.nhs.co.uk):
 - qualified first aider
 - 999 emergency services
 - paramedic
 - St John Ambulance
 - use of 111/112
 - local accident and emergency department
 - local minor injuries clinic
 - General Practitioner
 - physiotherapist
 - sports therapist
 - radiology.

D2 Principles of rehabilitation

Treatment and rehabilitation will be based on accurate assessment diagnosis by a qualified person.

- The five stages of rehabilitation:
 - acute
 - sub-acute
 - early rehabilitation
 - late rehabilitation
 - functional rehabilitation.
- Aim and goals of rehabilitation.
- Rationale – for the programme to be based on the formulated hypothesis as to why the injury occurred.
- Principles of rehabilitation:
 - ATCISIT – avoid aggravation, timing, compliance, individualisation, specific sequencing, intensity, total patient
 - SAID – specific adaptation to imposed demands
 - pain free.
- Progression of rehabilitation:
 - type of activity
 - duration of activity
 - frequency of activity/rest
 - intensity of activity
 - complexity of activity
 - regain full range of motion
 - restore muscle strength
 - normalise biomechanics
 - restore high speed
 - power
 - proprioception and agility
 - return to sport.
- Monitoring the rehabilitation programme:
 - factors to be monitored
 - consideration of adverse effects
 - documentation and recording of information.

D3 Methods of rehabilitation

Methods of rehabilitation should be delivered where possible in a practical context to allow learning to be engaging, and experience the exploration of progressions and adaptations.

- Methods to improve joint range of motion:
 - continuous passive motion
 - passive mobilisation
 - passive exercises
 - active exercises
 - active assisted exercises.
- Methods to improve musculotendinous flexibility:
 - stretching, e.g. passive, active, proprioceptive neuromuscular facilitation (PNF).
- Methods to improve muscle conditioning:
 - strength exercises – isometric, isokinetic, isotonic
 - power exercises – increase speed of exercise, plyometrics
 - endurance exercises – low load, high repetitions.

- Methods to improve neuromuscular control:
 - proprioception
 - co-ordination
 - balance exercises.
- Methods to improve skill acquisition/functionality:
 - exercises – combines strength power, endurance, flexibility and neuromuscular control that has been achieved in the form of exercise which uses muscle groups in tandem and forms the basis of the sport.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Understand acute and overuse injuries, their associated signs and symptoms and mechanism of injury		AB.D1 Evaluate injury mechanisms and the associated physiological and psychological responses to injury and rehabilitation, using specific examples.
A.P1 Discuss acute and overuse injuries, including signs and symptoms.	A.M1 Assess acute and overuse injuries, including signs, symptoms and examples of mechanisms of injury.	
Learning aim B: Examine the physiological and psychological responses to injury and rehabilitation		
B.P2 Explain how the body responds physiologically and the mind psychologically to sports injuries.	B.M2 Assess the physiological and psychological response to sports injuries, with regard to stages of injury including rehabilitation, using specific examples.	
Learning aim C: Investigate aetiology of sports injuries and their associated prevention strategies		C.D2 Evaluate the sequence of prevention model, justifying the different stages, using specific examples.
C.P3 Explain how extrinsic and intrinsic risk factors including gait analysis contribute to sports injuries and identify how they can be prevented, using specific examples.	C.M3 Assess gait analysis and injury, considering preventative measures for intrinsic and extrinsic risk factors, using specific examples.	
Learning aim D: Explore common treatment and rehabilitation methods		D.D3 Justify the rehabilitation programme design, including consideration of factors that may affect rehabilitation, future recommendations and considerations.
D.P4 Apply appropriate protocols when performing a range of treatment methods for four contrasting scenarios.	D.M4 Apply appropriate protocols in a confident and effective manner when performing a range of common treatment methods for four contrasting scenarios.	
D.P5 Design an appropriate rehabilitation programme for a specific sports injury, identifying factors that may affect rehabilitation.	D.M5 Design a detailed, safe and appropriate rehabilitation programme for a specific sports injury, including adaptations and alterations.	

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of three summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aims: A and B (A.P1, B.P2, A.M1, B.M2, AB.D1)

Learning aim: C (C.P3, C.M3, C.D2)

Learning aim: D (D.P4, D.P5, D.M4, D.M5, D.D3)

Further information for teachers and assessors

Resource requirements

For this unit, learners must have access to appropriate first-aid and rehabilitation equipment.

- First-aid equipment including CPR Anne resuscitation equipment, taping, bandages, slings, splints, ice and thermal packs.
- Rehabilitation equipment – wobble board, stability disc, stability ball, bosu, resistance bands and tubes, balls, reaction balls, cones, poles, stopwatch, whistle, free weights, kettlebells, medicine ball, mat, rebounder, skipping ropes/jump ropes, balance beam, tow ropes, parachutes, speed resistance bands, step, viper belt, hurdles.

The teacher should ideally hold a first-aid qualification such as First Aid at Work. Ideally, they should hold a degree in sports therapy or sports rehabilitation, or have covered sports injuries significantly during their training.

Essential information for assessment decisions

Learning aims A and B

Learners will produce a report that addresses acute and overuse sports injuries, their associated signs and symptoms, mechanisms of injury, and physiological and psychological response to injury. The report should be professionally presented using headings and annotation such as pictures and diagrams to support explanations (particularly for mechanisms). Accurate spelling and grammar will be evident, as well as authentication through referencing. Learners' work should be reflective of the full unit content.

For distinction standard, learners will carefully consider injury mechanisms and responses to them. They will make judgements as to the relevance and/or significance of the mechanisms and the associated physiological and psychological responses. Learners explore both the injury and rehabilitation phases as part of their examination. They clearly break down the theory related to the subject areas and from this they draw conclusions that are supported with well-considered examples. The information presented will be factually correct and use concise written language, and correct terminology and language should be evident.

For merit standard, learners will carefully consider all aspects of five acute and five overuse injuries that they have chosen. The assessment includes the signs and symptoms and examples of mechanisms of injury for each injury. Mechanisms of injury are considered with regard to the role of biomechanics and sports injuries. From these examinations, learners arrive at a conclusion for each chosen injury. These conclusions are supported by examples with annotated diagrams and pictures. Learners carefully consider the physiological and psychological responses in conjunction with the stage(s) of injury and rehabilitation, and draw conclusions supported by specific injury examples. The assessment could address different aspects of the responses, how they interrelate and the extent of importance. There will be few inaccuracies relating to the use of terminology, and the explanations should be clear, succinct and easy to understand.

For pass standard, learners will consider different aspects of acute and overuse injuries to demonstrate a clear understanding of the differences between acute and overuse injuries. Learners could also demonstrate an understanding of the specific injuries selected with regard to common signs and symptoms of the injury. Common signs and symptoms could include general signs of acuteness or overuse, as well as signs specific to the chosen injury. Learners should cover at least five acute injuries, for example bone, muscle strain/tear, ligament strain/tear, articular cartilage and joint, and five overuse injuries, for example bursa, ligament, muscle, tendon and bone. Learners must confirm the selected acute and overuse injuries with the assessor to ensure that full coverage of the unit content across the grade boundaries can be achieved. Learners consider the physiological responses to injury and any interrelationships between them. The three phases – inflammatory, proliferative and maturation – should all be clearly addressed with a sound explanation of what occurs in each phase and how. All unit content should be addressed. Learners will also give consideration to the psychological responses to injury. Learners' explanations must

provide full coverage of the unit content B2. The report may have occasional inaccuracies with regard to terminology and explanations; however, the information should be largely factually correct. There will be clear indication that five acute and five common sports injuries, with signs and symptoms and physiological and psychological responses to injury, have been examined. Annotation such as diagrams and pictures is encouraged to support learners' explanations.

Learning aim C

A presentation will cover the investigation of aetiology of sports injuries and their associated prevention strategies. The presentation can take various forms, but should be logical in its format and include headings, subheadings and diagrams where possible, as well as authentication through referencing. Spelling and grammar should be correct. The presentation must be reflective of the unit content.

For distinction standard, learners will present a careful consideration of the sequence of prevention model. They will examine the strengths, weaknesses and relative significance of each stage, justifying its place in the model. They will explore the risk factors which may contribute to sports injuries and their associated prevention strategies. Learners will make judgements about all aspects of the prevention model for sports injuries, drawing conclusions from it and supporting these conclusions with a range of specific, well-considered examples. The information will be factually correct, use concise written language and evidence correct terminology and language.

For merit standard, learners will present careful consideration of gait, structural and biomechanical abnormalities in association with lower limb injuries. They will consider the various factors before drawing conclusions as to the most appropriate preventative strategies to be used. Learners must demonstrate knowledge of correct walking and running gait and consideration of associated factors and footwear. Learners will consider preventative measures for extrinsic and intrinsic factors, using specific examples. They will examine different aspects and demonstrate an understanding of the interrelationship of risk factors and preventative strategies, as well as an understanding of the extent of importance. A number of specific examples should be used to support their conclusions. Discussion will be clear, flow well and be easy to understand. The essay will have few inaccuracies with regard to terminology.

For pass standard, learners will demonstrate an understanding of a wide range of intrinsic and extrinsic risk factors, using specific examples. A wide range will be determined by the extended scope and depth of factors covered. For example, 50 per cent of factors from the intrinsic and extrinsic subcategories may be addressed, covering the majority of factors in each subcategory in depth, or all subcategories may be addressed within the scope, including numerous but not all factors in each subcategory. Learners will show clear detail and provide justified reasoning and/or evidence. A clear comprehension of risk factors should be shown. Aetiology will include the explanation of abnormal biomechanical factors associated with the analysis of gait and sports injuries. Learners will identify associated preventative measures for each intrinsic and extrinsic risk factor, using specific examples. The essay may have occasional inaccuracies with regard to terminology.

Learning aim D

Learners will be issued with four contrasting scenarios, for example, unconscious casualty, treatment for bleeding and shock, fracture and sprain/strain. The scenarios issued must allow them to practically demonstrate a wide range of the related unit content and to take one scenario to develop a safe and appropriate rehabilitation programme, for example, the scenario regarding sprain/strain. They will decide how to treat each injury, and demonstrate confident and safe application of relevant common treatment methods and protocols. The scenarios issued must be contrasting, for example, scenario one may relate to an unconscious casualty or bleed, while scenario two will need to be of an appropriate nature to allow different common treatment methods and protocols to be administered, and provide scope for learners to devise a rehabilitation plan incorporating the breadth of unit content, for example a sprained ankle with grade 1/2 muscle tear. The evidence of the practical activity could include a video recording or annotated photographs.

For distinction standard, learners will give reasons to justify the rehabilitation programme design, as well as future recommendations and considerations. Learners will address the appropriateness of the scenario selected and why the programme is appropriate for meeting the aim and goals. Learners will apply theoretical knowledge of principles and methods of rehabilitation to the practical design of the programme. The information presented will be factually correct and use concise written language, and correct terminology and language should be evident. The importance of sports injury management will be considered with regard to its role in helping sports performers prevent or overcome common sports injuries. The importance of many factors in the management process will be considered, including aetiology, mechanism of injury, gait analysis, injury prevention, immediate treatment and rehabilitation. Judgements will be made and conclusions drawn about the role of sports injury management in preventing or overcoming sports injuries. Learners will use evidence to support carefully considered reasoning.

For merit standard, learners will confidently and effectively apply appropriate protocols when demonstrating common treatment methods. To be effective, the treatment will need to be applied following the correct procedure and have the capability of producing the immediate expected/intended result if the treatment were to be applied in a real-life situation. For example, when treating a lower limb bleed, the limb should always be elevated above the heart to have an optimum effect of reducing the blood flow. If this does not occur, the effectiveness of the treatment should be questioned. To ascertain a confident application, there should be no hesitation when applying the treatment method and no uncertainty of how to apply the treatment. Learners will design a safe and appropriate rehabilitation programme. For the rehabilitation programme to be safe, it will need to have the capability of producing the expected/intended result if the programme were to be applied in a real-life situation. Therefore, programme detail will address and encompass all aspects of rehabilitation programme design, including aims and goals, rationales, application of principles, progressions and monitoring. All aspects of methods of rehabilitation should be included and detailed, including a statement regarding the consequences of inadequate rehabilitation. Adaptations and alternative exercises should be included and documented. The programme should be safe if used in a realistic environment. The terminology used will be accurate and the explanations will be clear, succinct and coherent, demonstrating progression. Specific examples will be used with appropriate annotation.

For pass standard, learners will apply appropriate protocols when demonstrating common treatment methods in a simulated environment. The assessor should orally question learners to ascertain the need for medical referral and to whom the referral will be made. The evidence produced from the practical activity should include video recordings of both simulations and oral questioning and be accompanied by appropriate observation statements in order to comply with QA requirements. Learners may show some nervousness or indecision when performing the treatment methods. Learners will take one scenario and design a progressive appropriate rehabilitation programme for a specific sports injury. The scenario issued should allow the rehabilitation programme to address all five stages of rehabilitation, principles, progressions and methods of rehabilitation. Learners will provide additional annotation to monitor the programme. There may be some inaccuracies relating to the use of terminology and the explanations may lack clarity in some areas. Specific examples should be used with appropriate annotation. To ascertain appropriateness it should have a clear aim and rationale, show logical progression through the five stages of injury, applying methods, principles and progressions, and addressing all areas: joint range of motion, flexibility, muscle conditioning, neuromuscular control and skill acquisition/functional exercises. An awareness and understanding of rehabilitation programme design will be evident.

Links to other units

This unit links to:

- Unit 1: Sport and Exercise Physiology
- Unit 2: Functional Anatomy
- Unit 3: Applied Sport and Exercise Psychology
- Unit 4: Field and Laboratory-based Fitness Testing
- Unit 6: Coaching for Performance and Fitness
- Unit 7: Biomechanics for Sport and Exercise Science
- Unit 8: Specialised Fitness Training
- Unit 10: Physical Activity for Individual and Group-based Exercise
- Unit 11: Sports Massage
- Unit 13: Nutrition for Sport and Exercise Performance
- Unit 14: Technology in Sport and Exercise Science.

Employer involvement

This unit would benefit from employer involvement in the form of:

- provision of guest speakers
- participation in audience assessment of presentations
- opportunities to visit suitable businesses.

4 Planning your programme

How do I choose the right BTEC National qualification for my learners?

BTEC Nationals come in a range of sizes, each with a specific purpose. You will need to assess learners very carefully to ensure that they start on the right size of qualification to fit into their 16–19 study programme, and that they take the right pathways or optional units that allow them to progress to the next stage.

If a learner is clear that they want to progress to the workplace they should be directed towards an occupationally-specific qualification, such as a BTEC National Diploma, from the outset.

Some learners may want to take a number of complementary qualifications or keep their progression options open. These learners may be suited to taking a BTEC National Certificate or Extended Certificate. Learners who then decide to continue with a fuller vocational programme can transfer to a BTEC National Diploma or Extended Diploma, for example for their second year.

Some learners are sure of the sector they want to work in and are aiming for progression into that sector via higher education. These learners should be directed to the two-year BTEC National Extended Diploma as the most suitable qualification.

As a centre, you may want to teach learners who are taking different qualifications together. You may also wish to transfer learners between programmes to meet changes in their progression needs. You should check the qualification structures and unit combinations carefully as there is no exact match among the different sizes. You may find that learners need to complete more than the minimum number of units when transferring.

When learners are recruited, you need to give them accurate information on the title and focus of the qualification for which they are studying.

Is there a learner entry requirement?

As a centre it is your responsibility to ensure that learners who are recruited have a reasonable expectation of success on the programme. There are no formal entry requirements but we expect learners to have qualifications at or equivalent to Level 2.

Learners are most likely to succeed if they have:

- five GCSEs at good grades and/or
- BTEC qualification(s) at Level 2
- achievement in English and mathematics through GCSE or Functional Skills.

Learners may demonstrate ability to succeed in various ways. For example, learners may have relevant work experience or specific aptitude shown through diagnostic tests or non-educational experience.

What is involved in becoming an approved centre?

All centres must be approved before they can offer these qualifications – so that they are ready to assess learners and so that we can provide the support that is needed. Further information is given in *Section 8*.

What level of sector knowledge is needed to teach these qualifications?

We do not set any requirements for teachers but recommend that centres assess the overall skills and knowledge of the teaching team to ensure that they are relevant and up to date. This will give learners a rich programme to prepare them for employment in the sector.

What resources are required to deliver these qualifications?

As part of your centre approval you will need to show that the necessary material resources and work spaces are available to deliver BTEC Nationals. For some units, specific resources are required. This is indicated in the units.

How can myBTEC help with planning for these qualifications?

myBTEC is an online toolkit that supports the delivery, assessment and quality assurance of BTECs in centres. It supports teachers with activities, such as choosing a valid combination of units, creating assignment briefs and creating assessment plans. For further information see *Section 10*.

Which modes of delivery can be used for these qualifications?

You are free to deliver BTEC Nationals using any form of delivery that meets the needs of your learners. We recommend making use of a wide variety of modes, including direct instruction in classrooms or work environments, investigative and practical work, group and peer work, private study and e-learning.

What are the recommendations for employer involvement?

BTEC Nationals are vocational qualifications and, as an approved centre, you are encouraged to work with employers on the design, delivery and assessment of the course to ensure that learners have a programme of study that is engaging and relevant and that equips them for progression. There are suggestions in many of the units about how employers could become involved in delivery and/or assessment but these are not intended to be exhaustive and there will be other possibilities at local level.

What support is available?

We provide a wealth of support materials, including curriculum plans, delivery guides, authorised assignment briefs, additional papers for external assessments and examples of marked learner work.

You will be allocated a Standards Verifier early on in the planning stage to support you with planning your assessments. There will be extensive training programmes as well as support from our Subject Advisor team.

For further details see *Section 10*.

How will my learners become more employable through these qualifications?

All BTEC Nationals are mapped to relevant occupational standards (see *Appendix 1*).

Employability skills, such as team working and entrepreneurialism, and practical hands-on skills have been built into the design of the learning aims and content. This gives you the opportunity to use relevant contexts, scenarios and materials to enable learners to develop a portfolio of evidence that demonstrates the breadth of their skills and knowledge in a way that equips them for employment.

5 Assessment structure and external assessment

Introduction

BTEC Nationals are assessed using a combination of *internal assessments*, which are set and marked by teachers, and *external assessments* which are set and marked by Pearson:

- mandatory units have a combination of internal and external assessments
- all optional units are internally assessed.

We have taken great care to ensure that the assessment method chosen is appropriate to the content of the unit and in line with requirements from employers and higher education.

In developing an overall plan for delivery and assessment for the programme, you will need to consider the order in which you deliver units, whether delivery is over short or long periods and when assessment can take place. Some units are defined as synoptic units (see *Section 2*). Normally, a synoptic assessment is one that a learner would take later in a programme and in which they will be expected to apply learning from a range of units. Synoptic units may be internally or externally assessed. Where a unit is externally assessed you should refer to the sample assessment materials (SAMs) to identify where there is an expectation that learners draw on their wider learning. For internally-assessed units, you must plan the assignments so that learners can demonstrate learning from across their programme. A unit may be synoptic in one qualification and not another because of the relationship it has to the rest of the qualification.

We have addressed the need to ensure that the time allocated to final assessment of internal and external units is reasonable so that there is sufficient time for teaching and learning, formative assessment and development of transferable skills.

In administering internal and external assessment, the centre needs to be aware of the specific procedures and policies that apply, for example to registration, entries and results. An overview with signposting to relevant documents is given in *Section 7*.

Internal assessment

Our approach to internal assessment for these qualifications will be broadly familiar to experienced centres. It offers flexibility in how and when you assess learners, provided that you meet assessment and quality assurance requirements. You will need to take account of the requirements of the unit format, which we explain in *Section 3*, and the requirements for delivering assessment given in *Section 6*.

External assessment

A summary of the external assessment for this qualification is given in *Section 2*. You should check this information carefully, together with the unit specification and the sample assessment materials, so that you can timetable learning and assessment periods appropriately.

Learners must be prepared for external assessment by the time they undertake it. In preparing learners for assessment you will want to take account of required learning time, the relationship with other external assessments and opportunities for retaking. You should ensure that learners are not entered for unreasonable amounts of external assessment in one session. Learners may resit an external assessment to obtain a higher grade of near pass or above. If a learner has more than one attempt, then the best result will be used for qualification grading, up to the permitted maximum. It is unlikely that learners will need to or benefit from taking all assessments twice so you are advised to plan appropriately. Some assessments are synoptic and learners are likely to perform best if these assessments are taken towards the end of the programme.

Key features of external assessment in sport and exercise

In sport and exercise science, after consultation with stakeholders, we have developed the following.

- *Unit 1: Sport and Exercise Physiology* will contain short- and long-answer questions that will assess learners' understanding of physiology and how the different systems of the body can affect sports performance.
- *Unit 2: Functional Anatomy* will contain short- and long-answer questions that will assess learners' understanding of anatomy and how movement can affect sports performance.
- *Unit 3: Applied Sport and Exercise Psychology*, learners will interpret psychological factors and data to create and justify a psychological intervention programme based on these interpretations. The task will require learners to develop and justify a psychological intervention programme that meets the needs of a specific client.
- *Unit 13: Nutrition for Sport and Exercise Performance*, learners will interpret a case study on an individual who requires guidance on nutrition in response to their personal and training needs. The task will assess their ability to interpret, modify and adapt a nutritional programme for a given scenario.

Units

The externally-assessed units have a specific format which we explain in *Section 3*. The content of units will be sampled across external assessments over time through appropriate papers and tasks. The ways in which learners are assessed are shown through the assessment outcomes and grading descriptors. External assessments are marked and awarded using the grade descriptors. The grades available are Distinction (D), Merit (M), Pass (P) and Near Pass (N). The Near Pass (N) grade gives learners credit below a Pass, where they have demonstrated evidence of positive performance which is worth more than an unclassified result but not yet at the Pass standard.

Sample assessment materials

Each externally-assessed unit has a set of sample assessment materials (SAMs) that accompanies this specification. The SAMs are there to give you an example of what the external assessment will look like in terms of the feel and level of demand of the assessment. In the case of units containing synoptic assessment, the SAMs will also show where learners are expected to select and apply from across the programme.

The SAMs show the range of possible question types that may appear in the actual assessments and give you a good indication of how the assessments will be structured. While SAMs can be used for practice with learners, as with any assessment the content covered and specific details of the questions asked will change in each assessment.

A copy of each of these assessments can be downloaded from our website. An additional sample of each of the Pearson-set units will be available before the first sitting of the assessment to allow your learners further opportunities for practice.

6 Internal assessment

This section gives an overview of the key features of internal assessment and how you, as an approved centre, can offer it effectively. The full requirements and operational information are given in the *Pearson Quality Assurance Handbook*. All members of the assessment team need to refer to this document.

For BTEC Nationals it is important that you can meet the expectations of stakeholders and the needs of learners by providing a programme that is practical and applied. Centres can tailor programmes to meet local needs and use links with local employers and the wider vocational sector.

When internal assessment is operated effectively it is challenging, engaging, practical and up to date. It must also be fair to all learners and meet national standards.

Principles of internal assessment

Assessment through assignments

For internally-assessed units, the format of assessment is an assignment taken after the content of the unit, or part of the unit if several assignments are used, has been delivered. An assignment may take a variety of forms, including practical and written types. An assignment is a distinct activity completed independently by learners that is separate from teaching, practice, exploration and other activities that learners complete with direction from, and formative assessment by, teachers.

An assignment is issued to learners as an assignment brief with a defined start date, a completion date and clear requirements for the evidence that they need to provide. There may be specific observed practical components during the assignment period. Assignments can be divided into tasks and may require several forms of evidence. A valid assignment will enable a clear and formal assessment outcome based on the assessment criteria.

Assessment decisions through applying unit-based criteria

Assessment decisions for BTEC Nationals are based on the specific criteria given in each unit and set at each grade level. To ensure that standards are consistent in the qualification and across the suite as a whole, the criteria for each unit have been defined according to a framework. The way in which individual units are written provides a balance of assessment of understanding, practical skills and vocational attributes appropriate to the purpose of qualifications.

The assessment criteria for a unit are hierarchical and holistic. For example, if an M criterion requires the learner to show 'analysis' and the related P criterion requires the learner to 'explain', then to satisfy the M criterion a learner will need to cover both 'explain' and 'analyse'. The unit assessment grid shows the relationships among the criteria so that assessors can apply all the criteria to the learner's evidence at the same time. In *Appendix 2* we have set out a definition of terms that assessors need to understand.

Assessors must show how they have reached their decisions using the criteria in the assessment records. When a learner has completed all the assessment for a unit then the assessment team will give a grade for the unit. This is given simply according to the highest level for which the learner is judged to have met all the criteria. Therefore:

- to achieve a Distinction, a learner must have satisfied all the Distinction criteria (and therefore the Pass and Merit criteria); these define outstanding performance across the unit as a whole
- to achieve a Merit, a learner must have satisfied all the Merit criteria (and therefore the Pass criteria) through high performance in each learning aim
- to achieve a Pass, a learner must have satisfied all the Pass criteria for the learning aims, showing coverage of the unit content and therefore attainment at Level 3 of the national framework.

The award of a Pass is a defined level of performance and cannot be given solely on the basis of a learner completing assignments. Learners who do not satisfy the Pass criteria should be reported as Unclassified.

The assessment team

It is important that there is an effective team for internal assessment. There are three key roles involved in implementing assessment processes in your centre, each with different interrelated responsibilities, the roles are listed below. Full information is given in the *Pearson Quality Assurance Handbook*.

- The Lead Internal Verifier (the Lead IV) has overall responsibility for the programme, its assessment and internal verification to meet our requirements, record keeping and liaison with the Standards Verifier. The Lead IV registers with Pearson annually. The Lead IV acts as an assessor, supports the rest of the assessment team, makes sure that they have the information they need about our assessment requirements and organises training, making use of our guidance and support materials.
- Internal Verifiers (IVs) oversee all assessment activity in consultation with the Lead IV. They check that assignments and assessment decisions are valid and that they meet our requirements. IVs will be standardised by working with the Lead IV. Normally, IVs are also assessors but they do not verify their own assessments.
- Assessors set or use assignments to assess learners to national standards. Before taking any assessment decisions, assessors participate in standardisation activities led by the Lead IV. They work with the Lead IV and IVs to ensure that the assessment is planned and carried out in line with our requirements.

Effective organisation

Internal assessment needs to be well organised so that the progress of learners can be tracked and so that we can monitor that assessment is being carried out in line with national standards. We support you through, for example, providing training materials and sample documentation. Our online myBTEC service can help support you in planning and record keeping. Further information on using myBTEC can be found in *Section 10* and on our website.

It is particularly important that you manage the overall assignment programme and deadlines to make sure that learners are able to complete assignments on time.

Learner preparation

To ensure that you provide effective assessment for your learners, you need to make sure that they understand their responsibilities for assessment and the centre's arrangements.

From induction onwards, you will want to ensure that learners are motivated to work consistently and independently to achieve the requirements of the qualifications. Learners need to understand how assignments are used, the importance of meeting assignment deadlines, and that all the work submitted for assessment must be their own.

You will need to give learners a guide that explains how assignments are used for assessment, how assignments relate to the teaching programme, and how learners should use and reference source materials, including what would constitute plagiarism. The guide should also set out your approach to operating assessment, such as how learners must submit work and request extensions.

Setting effective assignments

Setting the number and structure of assignments

In setting your assignments, you need to work with the structure of assignments shown in the *Essential information for assignments* section of a unit. This shows the structure of the learning aims and criteria that you must follow and the recommended number of assignments that you should use. For some units we provide authorised assignment briefs, for all the units we give you suggestions on how to create suitable assignments. You can find these materials along with this specification on our website. In designing your own assignment briefs you should bear in mind the following points.

- The number of assignments for a unit must not exceed the number shown in *Essential information for assignments*. However, you may choose to combine assignments, for example to create a single assignment for the whole unit.
- You may also choose to combine all or parts of different units into single assignments, provided that all units and all their associated learning aims are fully addressed in the programme overall. If you choose to take this approach, you need to make sure that learners are fully prepared so that they can provide all the required evidence for assessment and that you are able to track achievement in the records.
- A learning aim must always be assessed as a whole and must not be split into two or more tasks.
- The assignment must be targeted to the learning aims but the learning aims and their associated criteria are not tasks in themselves. Criteria are expressed in terms of the outcome shown in the evidence.
- You do not have to follow the order of the learning aims of a unit in setting assignments but later learning aims often require learners to apply the content of earlier learning aims and they may require learners to draw their learning together.
- Assignments must be structured to allow learners to demonstrate the full range of achievement at all grade levels. Learners need to be treated fairly by being given the opportunity to achieve a higher grade if they have the ability.
- As assignments provide a final assessment, they will draw on the specified range of teaching content for the learning aims. The specified content is compulsory. The evidence for assessment need not cover every aspect of the teaching content as learners will normally be given particular examples, case studies or contexts in their assignments. For example, if a learner is carrying out one practical performance, or an investigation of one organisation, then they will address all the relevant range of content that applies in that instance.

Providing an assignment brief

A good assignment brief is one that, through providing challenging and realistic tasks, motivates learners to provide appropriate evidence of what they have learned.

An assignment brief should have:

- a vocational scenario, this could be a simple situation or a full, detailed set of vocational requirements that motivates the learner to apply their learning through the assignment
- clear instructions to the learner about what they are required to do, normally set out through a series of tasks
- an audience or purpose for which the evidence is being provided
- an explanation of how the assignment relates to the unit(s) being assessed.

Forms of evidence

BTEC Nationals have always allowed for a variety of forms of evidence to be used, provided that they are suited to the type of learning aim being assessed. For many units, the practical demonstration of skills is necessary and for others, learners will need to carry out their own research and analysis. The units give you information on what would be suitable forms of evidence to provide learners with the opportunity to apply a range of employability or transferable skills. Centres may choose to use different suitable forms for evidence to those proposed. Overall, learners should be assessed using varied forms of evidence.

Full definitions of types of assessment are given in *Appendix 2*. These are some of the main types of assessment:

- written reports
- projects
- time-constrained practical assessments with observation records and supporting evidence
- recordings of performance
- sketchbooks, working logbooks, reflective journals
- presentations with assessor questioning.

The form(s) of evidence selected must:

- allow the learner to provide all the evidence required for the learning aim(s) and the associated assessment criteria at all grade levels
- allow the learner to produce evidence that is their own independent work
- allow a verifier to independently reassess the learner to check the assessor's decisions.

For example, when you are using performance evidence, you need to think about how supporting evidence can be captured through recordings, photographs or task sheets.

Centres need to take particular care that learners are enabled to produce independent work.

For example, if learners are asked to use real examples, then best practice would be to encourage them to use their own or to give the group a number of examples that can be used in varied combinations.

Making valid assessment decisions

Authenticity of learner work

Once an assessment has begun, learners must not be given feedback on progress towards fulfilling the targeted criteria.

An assessor must assess only learner work that is authentic, i.e. learners' own independent work. Learners must authenticate the evidence that they provide for assessment through signing a declaration stating that it is their own work.

Assessors must ensure that evidence is authentic to a learner through setting valid assignments and supervising them during the assessment period. Assessors must take care not to provide direct input, instructions or specific feedback that may compromise authenticity.

Assessors must complete a declaration that:

- the evidence submitted for this assignment is the learner's own
- the learner has clearly referenced any sources used in the work
- they understand that false declaration is a form of malpractice.

Centres can use Pearson templates or their own templates to document authentication.

During assessment, an assessor may suspect that some or all of the evidence from a learner is not authentic. The assessor must then take appropriate action using the centre's policies for malpractice. Further information is given in *Section 7*.

Making assessment decisions using criteria

Assessors make judgements using the criteria. The evidence from a learner can be judged using all the relevant criteria at the same time. The assessor needs to make a judgement against each criterion that evidence is present and sufficiently comprehensive. For example, the inclusion of a concluding section may be insufficient to satisfy a criterion requiring 'evaluation'.

Assessors should use the following information and support in reaching assessment decisions:

- the *Essential information for assessment decisions* section in each unit gives examples and definitions related to terms used in the criteria
- the explanation of key terms in *Appendix 2*
- examples of assessed work provided by Pearson
- your Lead IV and assessment team's collective experience, supported by the standardisation materials we provide.

Pass and Merit criteria relate to individual learning aims. The Distinction criteria as a whole relate to outstanding performance across the unit. Therefore, criteria may relate to more than one learning aim (for example A.D1) or to several learning aims (for example DE.D3). Distinction criteria make sure that learners have shown that they can perform consistently at an outstanding level across the unit and/or that they are able to draw learning together across learning aims.

Dealing with late completion of assignments

Learners must have a clear understanding of the centre policy on completing assignments by the deadlines that you give them. Learners may be given authorised extensions for legitimate reasons, such as illness at the time of submission, in line with your centre policies.

For assessment to be fair, it is important that learners are all assessed in the same way and that some learners are not advantaged by having additional time or the opportunity to learn from others. Therefore, learners who do not complete assignments by your planned deadline or the authorised extension deadline may not have the opportunity to subsequently resubmit.

If you accept a late completion by a learner, then the assignment should be assessed normally when it is submitted using the relevant assessment criteria.

Issuing assessment decisions and feedback

Once the assessment team has completed the assessment process for an assignment, the outcome is a formal assessment decision. This is recorded formally and reported to learners.

The information given to the learner:

- must show the formal decision and how it has been reached, indicating how or where criteria have been met
- may show why attainment against criteria has not been demonstrated
- must not provide feedback on how to improve evidence
- must be validated by an IV before it is given to the learner.

Resubmission of improved evidence

An assignment provides the final assessment for the relevant learning aims and is normally a final assessment decision, except where the Lead IV approves one opportunity to resubmit improved evidence based on the completed assignment brief.

The Lead IV has the responsibility to make sure that resubmission is operated fairly. This means:

- checking that a learner can be reasonably expected to perform better through a second submission, for example that the learner has not performed as expected
- making sure that giving a further opportunity can be done in such a way that it does not give an unfair advantage over other learners, for example through the opportunity to take account of feedback given to other learners
- checking that the assessor considers that the learner will be able to provide improved evidence without further guidance and that the original evidence submitted remains valid.

Once an assessment decision has been given to the learner, the resubmission opportunity must have a deadline within 15 working days in the same academic year.

A resubmission opportunity must not be provided where learners:

- have not completed the assignment by the deadline without the centre's agreement
- have submitted work that is not authentic.

Retake of internal assessment

A learner who has not achieved the level of performance required to pass the relevant learning aims after resubmission of an assignment may be offered a single retake opportunity using a new assignment. The retake may only be achieved at a pass.

The Lead Internal Verifier must only authorise a retake of an assignment in exceptional circumstances where they believe it is necessary, appropriate and fair to do so. For further information on offering a retake opportunity, you should refer to the *BTEC Centre Guide to Assessment*. We provide information on writing assignments for retakes on our website (www.btec.co.uk/keydocuments).

Planning and record keeping

For internal processes to be effective, an assessment team needs to be well organised and keep effective records. The centre will also work closely with us so that we can quality assure that national standards are being satisfied. This process gives stakeholders confidence in the assessment approach.

The Lead IV must have an assessment plan, produced as a spreadsheet or using myBTEC. When producing a plan, the assessment team may wish to consider:

- the time required for training and standardisation of the assessment team
- the time available to undertake teaching and carry out assessment, taking account of when learners may complete external assessments and when quality assurance will take place
- the completion dates for different assignments
- who is acting as IV for each assignment and the date by which the assignment needs to be verified
- setting an approach to sampling assessor decisions through internal verification that covers all assignments, assessors and a range of learners
- how to manage the assessment and verification of learners' work so that they can be given formal decisions promptly
- how resubmission opportunities can be scheduled.

The Lead IV will also maintain records of assessment undertaken. The key records are:

- verification of assignment briefs
- learner authentication declarations
- assessor decisions on assignments, with feedback given to learners
- verification of assessment decisions.

Examples of records and further information are given in the *Pearson Quality Assurance Handbook*.

7 Administrative arrangements

Introduction

This section focuses on the administrative requirements for delivering a BTEC qualification. It will be of value to Quality Nominees, Lead IVs, Programme Leaders and Examinations Officers.

Learner registration and entry

Shortly after learners start the programme of learning, you need to make sure that they are registered for the qualification and that appropriate arrangements are made for internal and external assessment. You need to refer to the *Information Manual* for information on making registrations for the qualification and entries for external assessments.

Learners can be formally assessed only for a qualification on which they are registered. If learners' intended qualifications change, for example if a learner decides to choose a different pathway specialism, then the centre must transfer the learner appropriately.

Access to assessment

Both internal and external assessments need to be administered carefully to ensure that all learners are treated fairly, and that results and certification are issued on time to allow learners to progress to chosen progression opportunities.

Our equality policy requires that all learners should have equal opportunity to access our qualifications and assessments, and that our qualifications are awarded in a way that is fair to every learner. We are committed to making sure that:

- learners with a protected characteristic are not, when they are undertaking one of our qualifications, disadvantaged in comparison to learners who do not share that characteristic
- all learners achieve the recognition they deserve for undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Further information on access arrangements can be found in the Joint Council for Qualifications (JCQ) document *Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational Qualifications*.

Administrative arrangements for internal assessment

Records

You are required to retain records of assessment for each learner. Records should include assessments taken, decisions reached and any adjustments or appeals. Further information can be found in the *Information Manual*. We may ask to audit your records so they must be retained as specified.

Reasonable adjustments to assessment

A reasonable adjustment is one that is made before a learner takes an assessment to ensure that they have fair access to demonstrate the requirements of the assessments. You are able to make adjustments to internal assessments to take account of the needs of individual learners. In most cases this can be achieved through a defined time extension or by adjusting the format of evidence. We can advise you if you are uncertain as to whether an adjustment is fair and reasonable. You need to plan for time to make adjustments if necessary.

Further details on how to make adjustments for learners with protected characteristics are given on our website in the document *Supplementary guidance for reasonable adjustment and special consideration in vocational internally-assessed units*.

Special consideration

Special consideration is given after an assessment has taken place for learners who have been affected by adverse circumstances, such as illness. You must operate special consideration in line with our policy (see previous paragraph). You can provide special consideration related to the period of time given for evidence to be provided or for the format of the assessment if it is equally valid. You may not substitute alternative forms of evidence to that required in a unit, or omit the application of any assessment criteria to judge attainment. Pearson can consider applications for special consideration in line with the policy.

Appeals against assessment

Your centre must have a policy for dealing with appeals from learners. These appeals may relate to assessment decisions being incorrect or assessment not being conducted fairly. The first step in such a policy could be a consideration of the evidence by a Lead IV or other member of the programme team. The assessment plan should allow time for potential appeals after assessment decisions have been given to learners. If there is an appeal by a learner, you must document the appeal and its resolution. Learners have a final right of appeal to Pearson but only if the procedures that you have put in place have not been followed. Further details are given in the document *Enquiries and appeals about Pearson vocational qualifications and end point assessment policy*.

Administrative arrangements for external assessment

Entries and resits

For information on the timing of assessment and entries, please refer to the annual examinations timetable on our website.

Access arrangements requests

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

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

Access arrangements should always be processed at the time of registration. Learners will then know what type of arrangements are available in place for them.

Granting reasonable adjustments

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

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

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

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

Special consideration requests

Special consideration is an adjustment made to a student's mark or grade after an external assessment to reflect temporary injury, illness or other indisposition at the time of the assessment. An adjustment is made only if the impact on the learner is such that it is reasonably likely to have had a material effect on that learner being able to demonstrate attainment in the assessment.

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

Conducting external assessments

Centres must make arrangements for the secure delivery of external assessments. External assessments for BTEC qualifications include examinations, set tasks and performance.

Each external assessment has a defined degree of control under which it must take place. Some external assessments may have more than one part and each part may have a different degree of control. We define degrees of control as follows.

High control

This is the completion of assessment in formal invigilated examination conditions.

Medium control

This is completion of assessment, usually over a longer period of time, which may include a period of controlled conditions. The controlled conditions may allow learners to access resources, prepared notes or the internet to help them complete the task.

Low control

These are activities completed without direct supervision. They may include research, preparation of materials and practice. The materials produced by learners under low control will not be directly assessed.

Further information on responsibilities for conducting external assessment is given in the document *Instructions for Conducting External Assessments*, available on our website.

Dealing with malpractice in assessment

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

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

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

The procedures we ask you to adopt vary between units that are internally-assessed and those that are externally assessed.

Internally-assessed units

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

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

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

Externally-assessed units

External assessment means all aspects of units that are designated as external in this specification, including preparation for tasks and performance. For these assessments, centres must follow the JCQ procedures set out in the latest version of *JCQ Suspected Malpractice in Examinations and Assessments Policies and Procedures* (www.jcq.org.uk).

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

Learner malpractice

Heads of Centres are required to report incidents of any suspected learner malpractice that occur during Pearson external assessments. We ask that centres do so by completing a *JCQ Form M1* (available at www.jcq.org.uk/exams-office/malpractice) and emailing it and any accompanying documents (signed statements from the learner, invigilator, copies of evidence, etc.) to the Investigations Team at candidatemalpractice@pearson.com. The responsibility for determining appropriate sanctions or penalties to be imposed on learners lies with Pearson.

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

Teacher/centre malpractice

Heads of Centres are required to inform Pearson's Investigations Team of any incident of suspected malpractice by centre staff, before any investigation is undertaken. Heads of centres are requested to inform the Investigations Team by submitting a *JCQ Form M2(a)* (available at www.jcq.org.uk/exams-office/malpractice) with supporting documentation to pqsmalpractice@pearson.com. Where Pearson receives allegations of malpractice from other sources (for example Pearson staff or anonymous informants), the Investigations Team will conduct the investigation directly or may ask the head of centre to assist.

Incidents of maladministration (accidental errors in the delivery of Pearson qualifications that may affect the assessment of learners) should also be reported to the Investigations Team using the same method.

Heads of Centres/Principals/Chief Executive Officers or their nominees are required to inform learners and centre staff suspected of malpractice of their responsibilities and rights; see Section 6.15 of the *JCQ Suspected Malpractice in Examinations and Assessments Policies and Procedures* document.

Pearson reserves the right in cases of suspected malpractice to withhold the issuing of results and/or certificates while an investigation is in progress. Depending on the outcome of the investigation results and/or certificates may be released or withheld.

You should be aware that Pearson may need to suspend certification when undertaking investigations, audits and quality assurances processes. You will be notified within a reasonable period of time if this occurs.

Sanctions and appeals

Where malpractice is proven we may impose sanctions or penalties.

Where learner malpractice is evidenced, penalties may be imposed such as:

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

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

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

The centre will be notified if any of these apply.

Pearson has established procedures for centres that are considering appeals against penalties and sanctions arising from malpractice. Appeals against a decision made by Pearson will normally be accepted only from Heads of Centres (on behalf of learners and/or members of staff) and from individual members (in respect of a decision taken against them personally). Further information on appeals can be found in our *Enquiries and appeals about Pearson vocational qualifications and end point assessment policy*, which is on our website. In the initial stage of any aspect of malpractice, please notify the Investigations Team by email via pqsmalpractice@pearson.com who will inform you of the next steps.

Certification and results

Once a learner has completed all the required components for a qualification, even if final results for external assessments have not been issued, then the centre can claim certification for the learner, provided that quality assurance has been successfully completed. For the relevant procedures please refer to our *Information Manual*. You can use the information provided on qualification grading to check overall qualification grades.

Results issue

After the external assessment session, learner results will be issued to centres. The result will be in the form of a grade. You should be prepared to discuss performance with learners, making use of the information we provide and post-results services.

Post-assessment services

Once results for external assessments are issued, you may find that the learner has failed to achieve the qualification or to attain an anticipated grade. It is possible to transfer or reopen registration in some circumstances. The *Information Manual* gives further information.

Changes to qualification requests

Where a learner who has taken a qualification wants to resit an externally-assessed unit to improve their qualification grade, you firstly need to decline their overall qualification grade. You may decline the grade before the certificate is issued. For a learner receiving their results in August, you should decline the grade by the end of September if the learner intends to resit an external assessment.

Additional documents to support centre administration

As an approved centre you must ensure that all staff delivering, assessing and administering the qualifications have access to this documentation. These documents are reviewed annually and are reissued if updates are required.

- *Pearson Quality Assurance Handbook*: this sets out how we will carry out quality assurance of standards and how you need to work with us to achieve successful outcomes.
- *Information Manual*: this gives procedures for registering learners for qualifications, transferring registrations, entering for external assessments and claiming certificates.
- *Lead Examiners' Reports*: these are produced after each series for each external assessment and give feedback on the overall performance of learners in response to tasks or questions set.
- *Instructions for the Conduct of External Assessments (ICEA)*: this explains our requirements for the effective administration of external assessments, such as invigilation and submission of materials.
- *Regulatory policies*: our regulatory policies are integral to our approach and explain how we meet internal and regulatory requirements. We review the regulated policies annually to ensure that they remain fit for purpose. Policies related to this qualification include:
 - adjustments for candidates with disabilities and learning difficulties, access arrangements and reasonable adjustments for general and vocational qualifications
 - age of learners
 - centre guidance for dealing with malpractice
 - recognition of prior learning and process.

This list is not exhaustive and a full list of our regulatory policies can be found on our website.

8 Quality assurance

Centre and qualification approval

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

- Centres must have appropriate physical resources (for example, equipment, IT, learning materials, teaching rooms) to support the delivery and assessment of the qualification.
- Staff involved in the assessment process must have relevant expertise and/or occupational experience.
- There must be systems in place to ensure continuing professional development for staff delivering the qualification.
- Centres must have in place appropriate health and safety policies relating to the use of equipment by learners.
- Centres must deliver the qualification in accordance with current equality legislation.
- Centres should refer to the teacher guidance section in individual units to check for any specific resources required.

Continuing quality assurance and standards verification

On an annual basis, we produce the *Pearson Quality Assurance Handbook*. It contains detailed guidance on the quality processes required to underpin robust assessment and internal verification.

The key principles of quality assurance are that:

- a centre delivering BTEC programmes must be an approved centre, and must have approval for the programmes or groups of programmes that it is delivering
- the centre agrees, as part of gaining approval, to abide by specific terms and conditions around the effective delivery and quality assurance of assessment; it must abide by these conditions throughout the period of delivery
- Pearson makes available to approved centres a range of materials and opportunities, through online standardisation, intended to exemplify the processes required for effective assessment, and examples of effective standards. Approved centres must use the materials and services to ensure that all staff delivering BTEC qualifications keep up to date with the guidance on assessment
- an approved centre must follow agreed protocols for standardisation of assessors and verifiers, for the planning, monitoring and recording of assessment processes, and for dealing with special circumstances, appeals and malpractice.

The approach of quality-assured assessment is through a partnership between an approved centre and Pearson. We will make sure that each centre follows best practice and employs appropriate technology to support quality-assurance processes, where practicable. We work to support centres and seek to make sure that our quality-assurance processes do not place undue bureaucratic processes on centres. We monitor and support centres in the effective operation of assessment and quality assurance.

The methods we use to do this for BTEC Level 3 include:

- making sure that all centres complete appropriate declarations at the time of approval
- undertaking approval visits to centres
- making sure that centres have effective teams of assessors and verifiers who are trained to undertake assessment
- assessment sampling and verification, through requested samples of assessments, completed assessed learner work and associated documentation
- an overarching review and assessment of a centre's strategy for delivering and quality assuring its BTEC programmes, for example making sure that synoptic units are placed appropriately in the order of delivery of the programme.

Centres that do not fully address and maintain rigorous approaches to delivering, assessing and quality assurance cannot seek certification for individual programmes or for all BTEC Level 3 programmes. An approved centre must make certification claims only when authorised by us and strictly in accordance with requirements for reporting.

Centres that do not comply with remedial action plans may have their approval to deliver qualifications removed.

9 Understanding the qualification grade

Awarding and reporting for the qualification

This section explains the rules that we apply in awarding a qualification and in providing an overall qualification grade for each learner. It shows how all the qualifications in this sector are graded.

The awarding and certification of these qualifications will comply with regulatory requirements.

Eligibility for an award

In order to be awarded a qualification, a learner must complete all units, achieve a Near Pass (N) or above in all external units and a pass or above in all mandatory units unless otherwise specified. Refer to the structure in *Section 2*.

To achieve any qualification grade, learners must:

- complete and **have an outcome** (D, M, P, N or U) for all units within a valid combination
- achieve the **required units at Pass or above** shown in *Section 2*, and for the Extended Diploma achieve a minimum 900 GLH at Pass or above (or N or above in external units)
- achieve the **minimum number of points** at a grade threshold.

It is the responsibility of a centre to ensure that a correct unit combination is adhered to.

Learners who do not achieve the required minimum grade (N or P) in units shown in the structure will not achieve a qualification.

Learners who do not achieve sufficient points for a qualification or who do not achieve all the required units may be eligible to achieve a smaller qualification in the same suite provided they have completed and achieved the correct combination of units and met the appropriate qualification grade points threshold.

Calculation of the qualification grade

The final grade awarded for a qualification represents an aggregation of a learner's performance across the qualification. As the qualification grade is an aggregate of the total performance, there is some element of compensation in that a higher performance in some units may be balanced by a lower outcome in others.

In the event that a learner achieves more than the required number of optional units, the mandatory units along with the optional units with the highest grades will be used to calculate the overall result, subject to the eligibility requirements for that particular qualification title.

BTEC Nationals are Level 3 qualifications and are awarded at the grade ranges shown in the table below.

Qualification	Available grade range
Certificate, Extended Certificate, Foundation Diploma	P to D*
Diploma	PP to D*D*
Extended Diploma	PPP to D*D*D*

The *Calculation of qualification grade* table, shown further on in this section, shows the minimum thresholds for calculating these grades. The table will be kept under review over the lifetime of the qualification. The most up to date table will be issued on our website.

Pearson will monitor the qualification standard and reserves the right to make appropriate adjustments.

Learners who do not meet the minimum requirements for a qualification grade to be awarded will be recorded as Unclassified (U) and will not be certificated. They may receive a Notification of Performance for individual units. The *Information Manual* gives full information.

Points available for internal units

The table below shows the number of **points** available for internal units. For each internal unit, points are allocated depending on the grade awarded.

	Unit size	
	60 GLH	90 GLH
U	0	0
Pass	6	9
Merit	10	15
Distinction	16	24

Points available for external units

Raw marks from the external units will be awarded **points** based on performance in the assessment. The table below shows the **minimum number of points** available for each grade in the external units.

	Unit size	
	90 GLH	120 GLH
U	0	0
Near Pass	6	8
Pass	9	12
Merit	15	20
Distinction	24	32

Pearson will automatically calculate the points for each external unit once the external assessment has been marked and grade boundaries have been set. For more details about how we set grade boundaries in the external assessment please go to our website.

Claiming the qualification grade

Subject to eligibility, Pearson will automatically calculate the qualification grade for your learners when the internal unit grades are submitted and the qualification claim is made. Learners will be awarded qualification grades for achieving the sufficient number of points within the ranges shown in the relevant *Calculation of qualification grade* table for the cohort.

Calculation of qualification grade

Applicable for registration from 1 September 2016.

Extended Certificate		Foundation Diploma		Diploma		Extended Diploma	
360 GLH		510 GLH		720 GLH		1080 GLH	
Grade	Points threshold	Grade	Points threshold	Grade	Points threshold	Grade	Points threshold
U	0	U	0	U	0	U	0
P Pass	36	P	51	PP	72	PPP	108
				MP	88	MPP	124
						MMP	140
Merit	52	M	73	MM	104	MMM	156
				DM	124	DMM	176
						DDM	196
Distinction	74	D	104	DD	144	DDD	216
				D*D	162	D*DD	234
						D*D*D	252
Distinction*	90	D*	130	D*D*	180	D*D*D*	270

The table is subject to review over the lifetime of the qualification. The most up-to-date version will be issued on our website.

Examples of grade calculations based on table applicable to registrations from September 2016

Example 1: Achievement of an Extended Diploma with a PPP grade

	GLH	Type (Int/Ext)	Grade	Unit points
Unit 1	120	Ext	Pass	12
Unit 2	90	Ext	Near Pass	6
Unit 3	120	Ext	Pass	12
Unit 4	90	Int	Pass	9
Unit 5	90	Int	Pass	9
Unit 6	90	Int	Merit	15
Unit 13	120	Ext	Near Pass	8
Unit 7	60	Int	Pass	6
Unit 8	60	Int	Merit	10
Unit 9	60	Int	Pass	6
Unit 10	60	Int	Pass	6
Unit 11	60	Int	Pass	6
Unit 12	60	Int	Merit	10
Totals	1080		PPP	115

The learner has achieved a Near Pass or above in Units 1, 2, 3 and 13, and a Pass or above in 4, 5, 6.

The learner has sufficient points for a PPP grade

Example 2: Achievement of an Extended Diploma with a DDM grade

	GLH	Type (Int/Ext)	Grade	Unit points
Unit 1	120	Ext	Near Pass	8
Unit 2	90	Ext	Pass	9
Unit 3	120	Ext	Distinction	32
Unit 4	90	Int	Distinction	24
Unit 5	90	Int	Distinction	24
Unit 6	90	Int	Merit	15
Unit 13	120	Ext	Distinction	32
Unit 7	60	Int	Distinction	16
Unit 8	60	Int	Merit	10
Unit 9	60	Int	Merit	10
Unit 10	60	Int	Distinction	16
Unit 11	60	Int	Pass	6
Unit 12	60	Int	Merit	10
Totals	1080		DDM	212

The learner has sufficient points for a DDM grade

Example 3: An Unclassified result for an Extended Diploma

	GLH	Type (Int/Ext)	Grade	Unit points
Unit 1	120	Ext	Pass	12
Unit 2	90	Ext	Merit	15
Unit 3	120	Ext	Pass	12
Unit 4	90	Int	Pass	9
Unit 5	90	Int	Merit	15
Unit 6	90	Int	Distinction	24
Unit 13	120	Ext	Merit	20
Unit 7	60	Int	Unclassified	0
Unit 8	60	Int	Merit	10
Unit 9	60	Int	Unclassified	0
Unit 10	60	Int	Unclassified	0
Unit 11	60	Int	Unclassified	0
Unit 12	60	Int	Distinction	16
Totals	1080		U	133

The learner has 240 GLH at U.

The learner has sufficient points for a MPP and has achieved a Near Pass or above in Units 1, 2, 3 and 13, and Pass or above in Units 4, 5 and 6 but has not met the minimum requirement for 900 GLH at Pass or above.

10 Resources and support

Our aim is to give you a wealth of resources and support to enable you to deliver BTEC National qualifications with confidence. On our website you will find a list of resources to support teaching and learning, and professional development.

Support for setting up your course and preparing to teach

Specification

This **specification** (for teaching from September 2016) includes details on the administration of qualifications and information on all the units for the qualification.

Delivery Guide

This free guide gives you important advice on how to choose the right course for your learners and how to ensure you are fully prepared to deliver the course. It explains the key features of BTEC Nationals (for example employer involvement and employability skills). It also covers guidance on assessment (internal and external) and quality assurance. The guide tells you where you can find further support and gives detailed unit-by-unit delivery guidance. It includes teaching tips and ideas, assessment preparation and suggestions for further resources.

Schemes of work

Free sample schemes of work are provided for each mandatory unit. These are available in Word™ format for ease of customisation.

Curriculum models

These show how the BTECs in the suite fit into a 16–19 study programme, depending on their size and purpose. The models also show where other parts of the programme, such as work experience, maths and English, tutorial time and wider study, fit alongside the programme.

Study skills activities

A range of case studies and activities is provided; they are designed to help learners develop the study skills they need to successfully complete their BTEC course. The case studies and activities are provided in Word™ format for easy customisation.

myBTEC

myBTEC is a free, online toolkit that lets you plan and manage your BTEC provision from one place. It supports the delivery, assessment and quality assurance of BTECs in centres and supports teachers with the following activities:

- checking that a programme is using a valid combination of units
- creating and verifying assignment briefs (including access to a bank of authorised assignment briefs that can be customised)
- creating assessment plans and recording assessment decisions
- tracking the progress of every learner throughout their programme.

To find out more about myBTEC, visit the myBTEC page on the support services section of our website. We will add the new BTEC National specifications to myBTEC as soon as possible.

Support for teaching and learning

Pearson Learning Services provides a range of engaging resources to support BTEC Nationals, including:

- textbooks in e-book and print formats
- revision guides and revision workbooks in e-book and print formats
- teaching and assessment packs, including e-learning materials via the Active Learn Digital Service.

Teaching and learning resources are also available from a number of other publishers. Details of Pearson's own resources and of all endorsed resources can be found on our website.

Support for assessment

Sample assessment materials for externally-assessed units

Sample assessments are available for the Pearson-set units. One copy of each of these assessments can be downloaded from the website/available in print. For each suite an additional sample for one of the Pearson-set units is also available, allowing your learners further opportunities for practice.

Further sample assessments will be made available through our website on an ongoing basis.

Sample assessment materials for internally-assessed units

We do not prescribe the assessments for the internally-assessed units. Rather, we allow you to set your own, according to your learners' preferences and to link with your local employment profile.

We do provide a service in the form of Authorised Assignment Briefs, which are approved by Pearson Standards Verifiers. They are available via our website or free on myBTEC.

Sample marked learner work

To support you in understanding the expectation of the standard at each grade, examples of marked learner work at PM/MD grades are linked to the Authorised Assignment Briefs.

Training and support from Pearson

People to talk to

There are many people who are available to support you and provide advice and guidance on delivery of your BTEC Nationals. These include:

- Subject Advisors – available for all sectors. They understand all Pearson qualifications in their sector and so can answer sector-specific queries on planning, teaching, learning and assessment
- Standards Verifiers – they can support you with preparing your assignments, ensuring that your assessment plan is set up correctly, and support you in preparing learner work and providing quality assurance through sampling
- Curriculum Development Managers (CDMs) – they are regionally based and have a full overview of the BTEC qualifications and of the support and resources that Pearson provides. CDMs often run network events
- Customer Services – the 'Support for You' section of our website gives the different ways in which you can contact us for general queries. For specific queries, our service operators can direct you to the relevant person or department.

Training and professional development

Pearson provides a range of training and professional development events to support the introduction, delivery, assessment and administration of BTEC National qualifications. These sector-specific events, developed and delivered by specialists, are available both face to face and online.

'Getting Ready to Teach'

These events are designed to get teachers ready for delivery of the BTEC Nationals. They include an overview of the qualifications' structures, planning and preparation for internal and external assessment, and quality assurance.

Teaching and learning

Beyond the 'Getting Ready to Teach' professional development events, there are opportunities for teachers to attend sector- and role-specific events. These events are designed to connect practice to theory; they provide teacher support and networking opportunities with delivery, learning and assessment methodology.

Details of our training and professional development programme can be found on our website.

Appendix 1 Links to industry standards

BTEC Nationals have been developed in consultation with industry and appropriate sector bodies to ensure that the qualification content and approach to assessment aligns closely to the needs of employers. Where they exist, and are appropriate, National Occupational Standards (NOS) and professional body standards have been used to establish unit content.

Appendix 2 Glossary of terms used for internally-assessed units

This is a summary of the key terms used to define the requirements in the units.

Term	Definition
Analyse	Learners present the outcome of methodical and detailed examination either: <ul style="list-style-type: none"> • breaking down a theme, topic or situation in order to interpret and study the interrelationships between the parts and/or • of information or data to interpret and study key trends and interrelationships. Analysis can be through activity, practice, written or verbal presentation.
Assess	Learners present a careful consideration of varied factors or events that apply to a specific situation or, to identify those which are the most important or relevant and arrive at a conclusion.
Compare	Learners identify the main factors relating to two or more items/situations or aspects of a subject that is extended to explain the similarities, differences, advantages and disadvantages. This is used to show depth of knowledge through selection of characteristics.
Create/construct	Skills to make or do something, for example a display or set of accounts.
Discuss	Learners consider different aspects of: <ul style="list-style-type: none"> • a theme or topic; • how they interrelate; and • the extent to which they are important. A conclusion is not required.
Demonstrate	To show knowledge and understanding.
Evaluate	Learners' work draws on varied information, themes or concepts to consider aspects such as: <ul style="list-style-type: none"> • strengths or weaknesses • advantages or disadvantages • alternative actions • relevance or significance. Learners' inquiries should lead to a supported judgement showing relationship to its context. This will often be in a conclusion. Evidence will often be written but could be through presentation or activity.
Explore	Skills and/or knowledge involving practical testing or trialling.
Examine	Knowledge with application where learners are expected to select and apply knowledge to less familiar contexts.
Identify	Learners indicate the main features or purpose of something by recognising it and/or being able to discern and understand facts or qualities.

Term	Definition
Interpret	Learners state the meaning, purpose or qualities of something through the use of images, words or other expressions.
Investigate	Knowledge based on personal research and development.
Justify	Learners give reasons or evidence to: <ul style="list-style-type: none"> • support an opinion; or • prove something right or reasonable.
Manage	Learners engage with and influence an activity or process.
Report	Learners adhere to protocols, codes and conventions where findings or judgements are set down in an objective way.
Research	The learner proactively seeks information from primary and secondary sources.
Review	Process for learning (knowledge or skills)
Stage and manage	Organisation and management skills, for example running an event or a business pitch.
Undertake/carry out/develop	Skills. Often referring to given processes or techniques.

This is a key summary of the types of evidence used for BTEC Nationals.

Type of evidence	Definition and purpose
Case study	A specific example to which all learners must select and apply knowledge.
Project	A large-scale activity requiring self-direction of selection of outcome, planning, research, exploration, outcome and review.
Independent research	An analysis of substantive research organised by learners from secondary and, if applicable, primary sources.
Written task or report	Individual completion of a task in a work-related format, for example a report, marketing communication, set of instructions, giving information.
Simulated activity/role play	A multi-faceted activity mimicking realistic work situations.
Group task	Learners work together to show skills in defining and structuring activity as a group.
Presentation	Oral or through demonstration.
Production of plan/ business plan	Learners produce a plan as an outcome related to a given or limited task.
Reflective journal	Completion of a journal from work experience detailing skills acquired for employability.
Poster/leaflet	Documents providing well-presented information for a given purpose.

Pearson BTEC Level 3 Nationals in Sport and Exercise Science

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Diploma in Sport and Exercise Science

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First teaching from September 2016

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