

## Higher National Unit Specification

### General information for centres

**Unit title:** Sports Mechanics

**Unit code:** DD2T 35

**Unit purpose:** This unit introduces the candidate to the specific nature of biomechanics and the mechanical principles, which govern movement. The candidate will also learn that the application of these principles is central to the development of sporting performance.

On completion of this unit the candidate will be able to:

1. Describe mechanical principles.
2. Observe and identify biomechanical principles in a sporting performance.
3. Analyse sporting performance by use of observational skill and personal research.

**Credit value:** 1 HN Credit at SCQF level 8: (8 SCOTCAT credit points at SCQF level 8\*)

*\*SCOTCAT points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCOTCAT points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to doctorates.*

**Recommended prior knowledge and skills:** It would be beneficial for candidates to possess skills or experience relevant to the Unit, this will have been gained through HNC Units -Anatomy, Physiology and Energy Systems, and Principles of Fitness Training. Ultimately entry is at the discretion of the centre.

**Core skills:** There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

**Context for delivery:** If this unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes. This unit is included in the framework for the HND Sports Coaching with Development of Sport.

### Assessment:

Outcome 1 will be assessed through restricted response questions.

Outcome 2 will be assessed by an observation schedule.

Outcome 3 will be assessed by a report.

These will be conducted under controlled conditions.

## **Higher National Unit specification: statement of standards**

**Unit title:** Sports Mechanics

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The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

### **Outcome 1**

Describe mechanical principles.

#### **Knowledge and/or skills**

Mechanical Principles:

- Force
- Centre of gravity
- Types of motion.
- Impulse
- Momentum
- Factors affecting pathways
- Lever systems
- Dynamics
- Axis of rotation
- Spin
- Planes of the body

#### **Evidence requirements**

To achieve this outcome the candidate will require written evidence to demonstrate their understanding of all aspects of the knowledge and/or skills section. The instrument of assessment will be restricted response questions. Assessment will be conducted under supervision.

#### **Assessment guidelines**

The candidate will be required to produce satisfactory responses to all questions.

## **Higher National Unit specification: statement of standards (cont)**

**Unit title:** Sports Mechanics

### **Outcome 2**

Observe and identify biomechanical principles in a sporting performance.

#### **Knowledge and/or skills**

- What the body is doing
- How it is doing it
- Where the body is going
- Phases of the performance
- Observational skills

#### **Evidence requirements**

To achieve this outcome the candidate will be required to produce written evidence to demonstrate their understanding of all aspects of the knowledge and/or skills section. Each candidate will be required to observe a sporting performance on video (or equivalent) and/or a live performance and analyse the biomechanical principles shown. Assessment will be done under supervision.

#### **Assessment guidelines**

The candidate will be required to produce accurate analysis of the biomechanical principles, which have been observed on video and /or a live performance.

### **Outcome 3**

Analyse a sporting performance by use of observational skill and personal research.

#### **Knowledge and/or skills**

- Observation
  - Preparation
  - Action
  - Recovery
  - Quality of movement
- Research
  - Model performance
  - Application of mechanical principles
- Development
  - Plan of Action
  - Performance monitoring

## **Higher National Unit specification: statement of standards (cont)**

**Unit title:** Sports Mechanics

### **Evidence requirements**

A written report based on recorded or live performance. The report will include research into model performance of the skill being analysed including details of the application of mechanical principles. The report will include an account of the performance observed describing the quality of movement and the areas requiring development. This will involve devising a suggested Plan of Action and schedule for Performance monitoring. All aspects of the knowledge and skill section must be covered satisfactorily. The report will be in the region of 1500 words plus annotated diagrams and references.

### **Assessment guidelines**

Candidates will produce a written report to cover all above requirements.

## **Administrative Information**

**Unit code:** DD2T 35

**Unit title:** Sports Mechanics

**Superclass category:** MA

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## Higher National Unit specification: support notes

### Unit title: Sports Mechanics

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

### Guidance on the content and context for this Unit

The unit is likely to form part of a group award and is primarily designed to provide candidates with knowledge of the mechanical principles involved in sports performance, and subsequent analysis of the principles from outcome 1 by means of an observation analysis schedule. As such candidates will benefit from studying relevant subject based units prior to studying this unit, such as HNC Units: Anatomy, Physiology and Energy Systems.

#### Outcome 1:

Forces – Newton's Laws – inertia, steady state and equal & opposite

Internal - muscular contraction, summation of joint forces

External - gravity, friction, air resistance, up thrust of ground, point of application, direction, resultant action.

Centre of gravity – position, balancing point, base of support.

Types of motion – Linear, Angular, Curvilinear, Projectile.

Impulse – the time that a force works on a object.

Momentum – mass v velocity.

Factors affecting pathways – Angle of release, Drag force, Lift force, Type of spin.

Dynamics –

Time; sudden to sustained.

Weight; fine to firm,

Space; direct to indirect,

Flow; bound to free,

Lever system; 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> class.

Axis of rotation – vertical, sagittal, and linear.

Planes of the body – frontal, sagittal, horizontal.

#### Outcome 2:

Forces – friction, ground reaction, lift force, air resistance, gravity – stable v unstable, inertia, momentum, impulse, linear motion, curvilinear motion, angular motion, projectile motion, angle of release, type of spin.

Phases of the skill - Preparation, Action, Recovery.

Observational skills – what is the body doing, how is it doing it and where is it doing it.

## **Higher National Unit specification: support notes (cont)**

**Unit title:** Sports Mechanics

### **Outcome 3:**

Model performance:-

The theoretically ideal performance, to allow the observer to make comparisons.

The research of the Mechanical Principles demonstrated within this model performance.

Written feedback on the observed performance including a description of recognised faults.

Plan of Action – prioritise skill development.

Monitoring – Goal setting – short term, medium term, long term.

### **Guidance on the delivery and assessment of this Unit**

#### **Outcome 1:**

Assessment could be done immediately after delivery of the information, but the use of ongoing practical application will enhance students' understanding, and should, where possible be adopted on an ongoing basis.

#### **Outcomes 2 and 3**

This outcome allows the candidate to observe the application of bio-mechanical principles in performance. It is likely that this would follow naturally after an initial study of the Outcome 1.

Candidates will be required to research model performance and produce a written report. While candidates may have a shared experience for Outcome 2 and may have watched the same performance for Outcome 3, it is expected that research and submissions will be independent. Candidates may of course use performance from their own experience.

### **Open learning**

Open Learning implies that while candidates study out with the centres using materials provided, it would be necessary to attend the centre for assessment purposes. For further information on Open and Distance Learning please refer to the SQA publication, Assessment and Quality Assurance of Open and Distance Learning (SQA2000).

### **Special needs**

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

## **General information for candidates**

### **Unit title:** Sports Mechanics

This Unit introduces you to Biomechanics - the mechanical principles that govern all human movement. There will be reference to knowledge and/or skills gained from other Units in the HNC (Anatomy, Physiology and the Energy Systems, Sports Coaching Theory and Practice) The Unit will go on to develop your observation and analysis skills, to enable you to give appropriate feedback to enhance sporting performance.

On completion of this Unit you will be able to describe mechanical principles and the affect they have on sporting performance, this will be achieved by observation and analysis from video and live performance.

The Unit will be assessed by restricted response questions for Outcome 1, an observation schedule in outcome 2, and a comprehensive written report for Outcome 3.

### **Bibliography.**

[www.sportscoachuk.org](http://www.sportscoachuk.org)

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Biomechanics of Sport and Exercise, McGinnes,Peter M.1999