



## Higher National Unit specification

### General information for centres

**Unit title:** Qualitative Biomechanical Analysis

**Unit code:** F4SB 35

**Unit purpose:** This Unit is designed to give candidates applied knowledge of qualitative biomechanics. It provides the opportunity to design and carry out systematic observation strategies on performance and will investigate how injury can be minimised by using biomechanical analysis. On completion of the Unit the candidate should be able to:

- 1 Investigate and evaluate the effect of equipment modernisation on performance.
- 2 Develop a Systematic Observational Strategy.
- 3 Utilise a systematic observational strategy to carry out biomechanical analysis.
- 4 Evaluate the results of biomechanical analysis.
- 5 Analyse and Evaluate methods of minimising injury using biomechanical principles.

**Credit points and level:** 2 HN credits at SCQF level 8: (16 SCQF credit points at SCQF level 8\*)

*\*SCQF credit 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 SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

**Recommended prior knowledge and skills:** Access to this Unit will be at the discretion of the centre. However it would be beneficial if candidates have completed the HNC Unit *Sports Mechanics* (DD2T 35) as this explains the main mechanical principles involved in this Unit.

**Core Skills:** There are opportunities to develop the Core Skill of *Communication, Information Technology, Problem Solving* and *Working with Others* all at SCQF level 6 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.

**Assessment:** Assessment of individual Outcomes can be combined to reduce the assessment load. Outcomes 1 and 5 may lend themselves most easily to an investigation and could be combined although extended response questions could also be used. Outcomes 2, 3 and 4 can be combined into one practical project which would require some research by the candidates and so allowing them to take their work in the direction of a sport or activity which is of particular interest to them.

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

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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**

Investigate and evaluate the effect of equipment modernisation on performance

#### **Knowledge and/or Skills**

- ◆ Equipment
- ◆ Techniques
- ◆ Performance
- ◆ Injuries

#### **Evidence Requirements**

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing for one sport that they can carry out the following.

- ◆ evaluate the changes made to the design and manufacture of two pieces of equipment that have been redesigned through developments in sport technology by comparing them to their predecessor
- ◆ investigate and analyse the changes to two sporting techniques which have come about due to equipment advances
- ◆ explain specific changes to performance which have come about due to the above equipment advances
- ◆ investigate and analyse any differences in injury occurrence/severity related to one equipment change

Only points 2 and 3 need to consider the same sport as they are related. Points one and four may consider a different sport or sports to allow meaningful investigation.

#### **Assessment Guidelines**

The assessment for this Outcome may be combined with Outcome 5 details of which are given under Outcome 5. Alternatively candidates may carry out and present the findings of an investigation.

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

**Unit title:** Qualitative Biomechanical Analysis

### **Outcome 2**

Develop a Systematic Observational Strategy

#### **Knowledge and/or Skills**

- ◆ Development methods
- ◆ Critical features
- ◆ Scanning strategies
  - Phases of movement
  - Observation of balance
  - Importance of critical features
  - General to specific

#### **Evidence Requirements**

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ select an appropriate method for developing a Systematic Observation Strategy (SOS) for a selected skill (sporting technique)
- ◆ select a range of relevant critical features (points of observational focus) according to the skill (sporting technique) and analyse their importance through prioritisation
- ◆ evaluate and explain the benefits and drawbacks of different scanning strategies and make an appropriate selection based on the skill (sporting technique) being investigated

#### **Assessment Guidelines**

The assessment for this Outcome may be combined with Outcomes 3 and 4 details of which are given under Outcome 4.

### **Outcome 3**

Utilise a systematic observational strategy to carry out biomechanical analysis

#### **Knowledge and/or Skills**

- ◆ Live biomechanical analysis
- ◆ Video biomechanical analysis
- ◆ Data organisation and analysis
- ◆ Benefits and drawbacks

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

**Unit title:** Qualitative Biomechanical Analysis

### **Evidence Requirements**

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ carry out live biomechanical analysis using a systematic observational strategy
- ◆ carry out video biomechanical analysis using a systematic observational strategy
- ◆ collect, collate and explain information relating to the skill observed using the systematic observation strategy
- ◆ evaluate the benefits and drawbacks of each form of analysis carried out

### **Assessment Guidelines**

The assessment for this Outcome may be combined with Outcomes 2 and 4 details of which are given under Outcome 4.

## **Outcome 4**

Evaluate the results of biomechanical analysis

### **Knowledge and/or Skills**

- ◆ Model performance
- ◆ Errors and strengths of a skill (sporting technique)
- ◆ Methods of rating critical features
- ◆ Prioritisation of interventions

### **Evidence Requirements**

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ evaluate the observed skill using a model performance
- ◆ detect a minimum of two errors and two strengths of the skill (sporting technique)
- ◆ successfully rate critical features on a devised scale
- ◆ select and carry out appropriate intervention prioritisation based on errors detected
- ◆ recommend adjustments to improve skill execution
- ◆ present a detailed record of their strategy, its use and its evaluation

### **Assessment Guidelines**

The assessment for this Outcome may be combined with Outcomes 2 and 3. The assessment may take the form of an investigative assignment. Candidates will be required to record their findings. A performance checklist could be used to provide evidence for Outcome 3. Finally candidates could be asked to present their findings.

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

**Unit title:** Qualitative Biomechanical Analysis

### Outcome 5

Analyse and Evaluate methods of minimising injury using biomechanical principles

#### Knowledge and/or Skills

- ◆ Injury continuum
- ◆ Stages of the healing process
  - Inflammation
  - Repair
  - Remodelling
- ◆ Factors affecting injury
  - Technique
  - Playing Surface
  - Equipment
- ◆ Injury types
  - Intrinsic — overuse and incidental
  - Extrinsic — fall, blow and traumatic
- ◆ Methods for preventing injury

#### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ describe the acute/chronic injury continuum
- ◆ analyse the importance of the main stages in the healing process by discussing the how they would occur for one specific injury
- ◆ evaluate the factors affecting injury by analysing how they will affect occurrence and severity of injury in one specific sport
- ◆ analyse injury types by differentiating between intrinsic and extrinsic types in one sport
- ◆ evaluate a minimum of two methods which can be used by Sports Scientists and athletes to prevent injury

#### Assessment Guidelines

The assessment for this Outcome may be combined with Outcome 1. The assessment could take the form of an investigation where candidates can choose a sports area of interest and research this area with respect to Outcome 1 and 5. Alternatively, the assessment could take the form of extended response questions where candidates are given suitable opportunity to explain a depth of understanding of the knowledge and skills section.

## Administrative Information

**Unit code:** F4SB 35

**Unit title:** Qualitative Biomechanical Analysis

**Superclass category:** RH

**Original date of publication:** August 2008

**Version:** 01

### History of changes:

Version	Description of change	Date

**Source:** SQA

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## **Higher National Unit specification: support notes**

### **Unit title: Qualitative Biomechanical Analysis**

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 80 hours.

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

This Unit is intended to extend the base of knowledge gained in the HNC *Sports Mechanics* Unit. The context of the Unit should be as practical and applied as possible. The chance to observe, analyse and evaluate a range of skills and techniques from different sports should be given wherever possible. The level of performer observed should also be varied wherever possible. The specific sporting skills of the class group should be taken advantage of here. Involving group work and investigation/research (discovery learning) during the more theoretical Outcomes will allow candidates to feel more involved in the Unit and take responsibility for their learning.

Outcome 1 — as mentioned previously investigation and group work would suit this Outcome. Comparison of previous equipment type to modern equipment will be useful here. Using photos and/or videos to highlight the extent of the changes that have been made will bring the concepts home. If possible it would be great to give the candidates the opportunity to carry out skills and/or techniques using different versions of the equipment. Examples which may be accessible would include racquets (badminton, tennis and squash), footballs, hockey sticks and football boots (blades). This would allow for even more applied knowledge to be gained and more time spent in the practical setting.

Outcome 2, 3 and 4 — these Outcomes will largely involve the candidate looking into their specified area to put together the investigation by developing and using a Systematic Observational Strategy. The initial input in these Outcomes will involve informing candidates of the choices they need to make during the planning stage. Providing early opportunity for the candidates to practice using observational checklists will allow them to make more informed decisions when it comes to beginning their assessment investigations.

Outcome 5 — this gives the opportunity to look at the risks that performers are exposed to. It may be that this Outcome becomes the most theoretical in the Unit as candidates have to cover some very specific criteria to meet the Evidence Requirements. Some form of presentation will be needed to get the facts across but debate and discussion could complement this ideally with comparisons being made between sports for instance.

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

This Unit will lend itself to being delivered in several different orders. What may be the deciding factor of how it is delivered may be whereabouts in the academic year that it is delivered compared to the Graded Unit. Outcomes 2–4 could very successfully be integrated into, but not duplicated in, the Graded Unit (Implementation). If this Unit is delivered firstly before the Graded Unit then it would perhaps be best to cover Outcomes 1 and 5 first to allow candidates to re-introduce themselves to these mechanical concepts. Also if these Outcomes are to be assessed by investigation/assignment/extended response then this can be completed while candidates are given the opportunity to practice observation skills and checklists before they must design and use their own in Outcomes 2–4.

## Higher National Unit specification: support notes

### Unit title: Qualitative Biomechanical Analysis

It is at this point that the Systematic Observation Strategy could be used within the Graded Unit. However if the Graded Unit is to be delivered at the same time as this Unit then it may be beneficial to get candidates practicing and considering the design of their SOS from the outset. This means Outcomes 2-4 would be covered first allowing them to hone the skills that may be of use to them within the Graded Unit. After this has been completed Outcomes 1 and 5 could be successfully covered and completed.

#### *Opportunities for developing Core Skills*

In order to develop the Core Skills mentioned early in the Unit specification the following opportunities could be taken.

*Written Communication* — through the answers given in the extended response and assignment style questions candidates will have the opportunity to develop this Core Skill.

*Oral Communication* — by periodically asking candidates to feedback to the class on the investigations they are carrying out for Outcomes 1 and 5 they will be able to improve this skill. If it is decided that any of the investigations are to be assessed by presentation this would provide even more opportunity.

*Information Technology* — it is likely that the investigative sections of the Unit will involve candidates accessing the internet for some references and information. This combined with the lecturer encouraging candidates to use word processing to complete investigations which have to be handed in will allow this Core Skill to be developed. Finally if any Outcomes are assessed by oral presentation then this could provide the opportunity to increase knowledge of Presentation Software.

*Problem Solving* — by being given the opportunity to investigate the areas involved in this Unit problem solving will be essential in the form of planning and organisation.

*Working with Others* — group work will form the basis of class discussions and debates and enhance the candidate's ability to work successfully with other class members.

### Open learning

Due to the nature of this Unit and the practical/applied nature it is difficult to see how it could be delivered in an open learning context. The difficulty comes in ensuring that video and live analysis is carried out and the work carried out in designing the SOS is that of the candidate.

Also much of the experience would be lost by the candidates missing out in the research, investigations, oral presentations and discussions.

### Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* ([www.sqa.org.uk](http://www.sqa.org.uk)).



## General information for candidates

### Unit title: Qualitative Biomechanical Analysis

This Unit is designed to expand your knowledge of biomechanics by explaining the impact that this area has on sport, performance, equipment and injury. Much of the time in this Unit will be spent in an applied/practical setting.

The Outcomes that you will cover are

- 1 Investigate and evaluate the effect of equipment modernisation on performance.
- 2 Develop a Systematic Observational Strategy.
- 3 Utilise a systematic observational strategy to carry out biomechanical analysis.
- 4 Evaluate the results of biomechanical analysis.
- 5 Analyse and Evaluate methods of minimising injury using biomechanical principles.

By investigating equipment and injury in some detail you will be able to see how the two areas are linked. The opportunity will be given for you to discuss these equipment changes and debate how they affect sport. Be involved whenever possible in these sorts of discussions and give your input whenever possible.

Outcomes 2, 3 and 4 will provide the knowledge to allow you to make an educated decision on the design of your own Systematic Observational Strategy (SOS) which could be described as a complex observation checklist involving evaluation, intervention and prioritisation of correction that you feel should be made to the skill you have selected.

This hands on approach is designed to give you the ability to confidently use skills within the area of biomechanics which will be of use whether you work with a sporting individual/team or an exerciser who needs advice on technique.

Assessment for this Unit is likely to include one large investigation in the form of the Systematic Observational Strategy. This will more than likely cover Outcomes 2, 3 and 4. Take the time to plan this investigation as the quality of the SOS you design will determine the quality of the work you are able to produce for the rest of that investigation. Outcomes 1 and 5 are likely to be assessed by use of an assignment or extended response questions. The assignment for Outcome 1 may again allow you some freedom with respect to the direction you take but because the areas you must cover in Outcome 5 are very specific it is best that you are asked specific questions to ensure that you are able to meet all the Evidence Requirements.