Unit 43: Laboratory and Experimental Methods in Sport and Exercise Sciences

Unit code: L/600/0032

QCF Level 4: BTEC Higher National

Credit value: 10

Guided learning hours: 60

Aim and purpose

The aim of this unit is to enable learners to explore standard procedures in kinanthropometry and to increase familiarity with laboratory and experimental methods.

Unit introduction

This unit will enable learners to understand, develop and apply practical skills and sporting knowledge to a variety of laboratory and experimental methods. Learners will develop an understanding and appreciation of the importance of adhering to health and safety protocols when conducting experimental methods and tests. Learners will develop skills to become adept at handling and interpreting scientific data. It is intended that this unit will enable learners to reflect and incorporate specialist knowledge and skills developed during their first year of study at BTEC National level.

The unit provides an introduction to laboratory and experimental methods in kinanthropometry, giving learners a valuable experience for higher level experimental work. Kinanthropometry describes the relationship between the structure and function of the human body, specifically when applied to human movement. Kinanthropometry has applications across a wide number of areas, including biomechanics, nutrition and exercise physiology.

Learners will be introduced to alternative anthropometric methods for the prediction of percent body fat of an individual. Learners will develop the practical skills necessary to use anthropometric techniques and explore factors which might affect accuracy of results. Learners will then apply statistical analyses to determine the degree of relationship or difference between the alternative anthropometric methods, and the implications this may have for predicting the percent body fat of the individual.

Learners will then progress to practical assessment and interpretation of the anthropometric somatotype. Somatotyping is a method used to describe current human physique in terms of body shape and composition. Learners will investigate the anthropometric somatotype of an individual, interpreting the results and relating these to current and future sports performance.

The final part of the unit enables learners to estimate the aerobic fitness (maximum oxygen uptake) of an individual using alternative modes of assessment. Application of statistical techniques will enable learners to determine the degree of relationship or difference between methods selected. A thorough understanding of the test methods will enable learners to explore and account for any differences in the prediction of aerobic fitness which might occur. Learners will then interpret the aerobic fitness levels of the individual against normative data, and data for elite performers, highlighting strengths and providing recommendations for improvement.

Collectively, the classic laboratory and experimental methods explored in this unit give learners an understanding of kinanthropometry and anthropometric practical techniques. Learners could use and apply the knowledge and skills gained from this unit to bridge the gap between college/school and progression to further study at undergraduate degree level or a professional qualification in the sport and exercise sciences or related areas.

Learning outcomes

On completion of this unit a learner should:

1 Understand health, safety and ethical issues associated with laboratory and experimental methods in sport and exercise sciences

2 Be able to estimate percent body fat using anthropometric methods

3 Be able to measure and interpret the anthropometric somatotype

4 Be able to use experimental methods to predict maximum oxygen uptake.

Unit content

1 Understand health, safety and ethical issues associated with laboratory and experimental methods in sport and exercise sciences

Health and safety issues: gaining permission to test from the subject; use of health screening; use of informed consent, subject disclaimer; preparation of the subject; test sequence; laboratory safety procedures; first aid procedures; reasons for terminating a test

Ethical issues: eg recording results, confidentiality of data, storage of data, ethical clearance, ensuring the welfare of the subject throughout the test procedures

2 Be able to estimate percent body fat using anthropometric methods

Anthropometric methods: Durnin and Wormersley skinfold method (bicep, tricep, subscapular, suprailiac); Jackson and Pollock skinfold method for males (chest, abdomen, thigh); Jackson and Pollock skinfold method for females (triceps, suprailiac, thigh); Bioelectrical Impedance Analysis; Hydrodensitometry; other methods eg circumferential analyses

Test guidelines: pre-test preparation, eg gaining permission to test, informed consent; practice and application of correct technique; units of measurement

Validity issues: eg calibration of equipment, test variables, other considerations, eg preparation of subject

Reliability issues: eg consistency of results (trial one, trial two, average), acceptable difference existing between trials

Calculations to estimate percent body fat: equation to predict body density; equation to predict percent body fat (according to method employed, age, gender and ethnic origin); use of nomogram

Interpretation of results: use of statistical tests to determine degree of relationship or difference between alternate methods, eg Pearson's product moment correlation coefficient (r), t-tests; compare to norms for age, gender and ethnic origin; strengths and areas for improvement

3 Be able to measure and interpret the anthropometric somatotype

Measurement of anthropometric somatotype: pre-test preparation, eg gaining permission to test, informed consent; Heath-Carter anthropometric somatotype (use of Heath-Carter somatotype rating form); first component (skinfolds); second component (height, bone diameters, girths); third component (height weight ponderal index)

Interpretation of results: plot on somatochart; categories (endomorph, mesomorph, ectomorph, other somatotype categories); related to sports performance; strengths and areas for improvement

4 Be able to use experimental methods to predict maximum oxygen uptake

Experimental methods: pre-test preparation, eg gaining permission to test, informed consent, health screening; test validity and reliability issues; aerobic run tests, eg multistage fitness test, 12-minute run test, 1.5-mile run test; aerobic step tests, eg Harvard step test, Forestry step test, Queens college step test; aerobic cycle tests, eg Astrand cycle ergometry test

Interpretation of results: applying statistical tests to determine degree of relationship or difference between test results, eg Pearson's product moment correlation coefficient (r), t-tests; validity issues; reliability issues; comparison to norms for age and gender; comparison to elite sports performers; strengths and areas for improvement

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 explain health and safety issues associated with laboratory and experimental methods in sport and exercise sciences [IE1, IE6]		
P2 evaluate ethical issues associated with laboratory and experimental methods in sport and exercise sciences [IE1, IE6]		
P3 follow test guidelines for the prediction of percent body fat of an individual using two alternative anthropometric methods [IE2]		
P4 describe validity and reliability issues of the two selected anthropometric methods [IE1, IE3, IE4, IE6]	**M1** explain validity and reliability issues of the two selected anthropometric methods	**D1** analyse validity and reliability issues of the two selected anthropometric methods
P5 carry out calculations for the prediction of percent body fat of an individual using two alternative anthropometric methods, interpret results and describe the strengths and areas for improvement [IE1, IE2, IE3, IE4, IE5, IE6, TW1, TW3, TW4, TW5, TW6, RL1, RL5, RL6]	**M2** carry out calculations for the prediction of percent body fat of an individual using two alternative anthropometric methods, explaining the results and the strengths and areas for improvement	
P6 carry out an assessment of the anthropometric somatotype of an individual, describing the results [IE1, IE2, IE3, IE4, IE5, IE6, TW1, TW3, TW4, TW5, TW6, RL1, RL5, RL6]	**M3** carry out an assessment of the anthropometric somatotype of an individual, explaining the results	**D2** carry out an assessment of the anthropometric somatotype of an individual, analysing the results

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P7 follow two different experimental methods to predict the maximum oxygen uptake of an individual, describing the results. [IE1, IE2, IE3, IE4, IE5, IE6, TW1, TW3, TW4, TW5, TW6, RL1, RL5, RL6]	**M4** follow two different experimental methods to predict the maximum oxygen uptake of an individual, explaining the results.	**D3** follow two different experimental methods to predict the maximum oxygen uptake of an individual, analysing the results.

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

This unit should be delivered in the second year of the programme. It is intended that the unit is delivered in-house, with use of external resources as required. The unit should be delivered through a combination of theoretical and practical sessions. An investigative and experimental approach to the delivery of this unit is essential.

The unit may be delivered through a mix of lectures and practical workshops with sufficient time allocated for learners to practically investigate and conduct anthropometric and experimental methods covering:

- the use of anthropometric methods to analyse percent body fat
- the measurement and interpretation of the anthropometric somatotype *and*
- the use of experimental methods to predict maximum oxygen consumption.

The unit should be introduced with the tutor explaining health, safety and ethical issues associated with conducting laboratory and experimental methods in sport and exercise sciences. The areas to be covered are stated in the *Unit content*. Exploring a number of case studies here would prove useful. The importance of gaining informed consent and screening should be thoroughly explored before planning to work with human subjects. Learners need to be aware of the importance of gaining medical and ethical clearance, and how to ensure confidentiality of subjects. Learners will also need to ensure the welfare of subjects throughout the laboratory and experimental methods to be conducted. Pre-test procedures must be conducted and consent obtained from subjects prior to conducting any tests. Learners will also need to be fully aware of reasons for terminating a test and the procedures to follow.

Tutors should introduce each practical method and sufficient time must be allocated to allow learners to become familiar and proficient with test methodology and techniques. Learners should have the opportunity to practice techniques on their peers through a number of practice sessions and workshops. The practice sessions could be organised into small group work, giving learners 'hands-on' experience and opportunity to observe and give feedback to others. By practically exploring test methods, learners should be able to identify and describe the validity and reliability issues which might affect test results.

The first practical workshop will require learners to cover two different anthropometric body fat methods from:

- skinfold analyses
- bioelectrical impedance analysis (BIA)
- hydrodensitometry
- circumferential analysis

Learners need to follow test guidelines and undertake two alternative anthropometric methods for the prediction of percent body fat of an individual. Two alternative skinfold methods may be selected. Care must be taken to ensure correct methodology is employed according to gender.

Supported by theoretical input from tutors, learners will then analyse the percent body fat results, conducting statistical analyses to determine the degree of relationship or difference between the two alternative methods. Learners will also need to describe the strengths and areas for improvement by comparing results to percent body fat norms according to age, gender and ethnic origin of the individual tested.

The second practical workshop enables learners to explore the Heath-Carter (1967) anthropometric somatotype. Learners need to be able to follow standard procedures to obtain measurements for the three-component somatotype rating of an individual. Again, the anthropometric somatotype practical methodology must be underpinned by theoretical concepts and sufficient time allocated for learners to practice test methodology before commencing data collection on a selected individual. Learners will need to be familiar with the Heath-Carter rating form, use of a somatochart and anthropometric somatotype categories for interpretation. Learners will also need to be able to relate the resulting somatotype of the individual to their current and future sports performance potential, identifying strengths and areas for improvement.

The third practical workshop allows learners to apply their knowledge of fitness testing obtained in the first year of study. Learners need to select two different experimental methods for the prediction of maximum oxygen uptake of an individual. As with all previous practical sessions, pre-test procedures must be employed and consent gained from the individual to be tested prior to test administration. Two different tests for the prediction of maximum oxygen consumption must be selected. The two tests must be selected from different exercise modes ie running, cycling or stepping.

By conducting statistical tests learners will be able to interpret test results and determine the degree of relationship or difference that exists between the two methods selected. By applying their knowledge and understanding of test methodology, learners should account for any differences arising, which may be linked to issues with test validity and/or reliability. Finally, learners will need to interpret the aerobic fitness level of the individual by comparing results to normative data and data for elite sports performers, describing strengths and areas for improvement.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Tutor overview of the unit and assessment.
Assignment 1: Using Anthropometric Methods to Predict Percent Body Fat (P1, P2, P3, P4, M1, D1, P5, M2). Tutor introduces the assignment brief.
Health, safety and ethical issues when dealing with human subjects: learner practical preparation for undertaking experimental methods and anthropometric measurements (group discussion).
Skinfold technique: tutor practical introduction to methodology and learner practice of technique.
Preparing to test: learner activity to prepare informed consent, disclaimer, health screening questionnaire.
Bioelectrical Impedance Analysis (BIA) and skinfold testing: validity and reliability issues – interactive lecture.
Exploring alternative methods of skinfold testing: learner practical sessions and workshop.
Exploring BIA: tutor introduction and learner practical activity.
Estimation and calculation of percent body fat of an individual: lecture followed by learner practical workshops.
Tutor introduction to statistical analyses: t-test and Pearson's (r). Learner activity to apply analysis to data collected.

Topic and suggested assignments/activities and/assessment
Assignment 2: The Anthropometric Somatotype (P6, M3, D2). Tutor introduces the assignment brief.
Tutor introduction: methodology and applications of the anthropometric somatotype (including use of the Heath-Carter rating form).
Measuring skinfolds – learner practice of technique and practical activity.
Measuring circumferences – learner practice of technique and practical activity.
Measuring bone diameters – learner practice of technique and practical activity.
Plotting the anthropometric somatotype and results interpretation – learner practical workshop.
Assignment 3: Use of Experimental Methods to Predict Maximum Oxygen Uptake (P7, M4, D3). Tutor introduces the assignment brief.
Health and safety considerations and preparation – interactive lecture.
Exploring test validity and reliability issues – interactive lecture.
Exploring test methodology: learner practical activities to predict maximum oxygen uptake, includes time allocated for practice of test methods and learner-initiated private study.
Applying statistical techniques to data collection: lecture followed by learner practical workshops.
Learner interpretation of results including write-up.
Review of the unit and assessment activities

Assessment

Learning and assessment for this unit is best achieved via the practical observation and assessment of learners undertaking a series of three practical workshops. Assessment evidence for the unit is best generated through the production of a scientific laboratory report for each of the three practical workshops.

Practical workshop 1

Before undertaking any laboratory or experimental testing involving human subjects, learners must be able to explain health and safety issues associated with conducting experimental methods in sport and exercise sciences (P1). Learners will also need to evaluate ethical issues associated with testing human subjects (P2). Evidence for criteria P1 and P2 could be generated through oral questioning supported by a witness statement from the tutor. Alternatively, evidence could be generated as a written report. The first practical workshop will require learners to practically demonstrate their ability to follow test guidelines for the prediction of percent body fat of an individual via two alternative anthropometric methods (P3). Learners need to apply their understanding and experience of test methodology to describe validity and reliability issues of the two methods selected (P4). Learners should then carry out calculations to predict the percent body fat of the individual via the two alternative methods selected (P5). To do this learners will need to apply equations for the prediction of body density followed by regression equations for the prediction of percent body fat. Learners must select and apply valid prediction equations, taking into account the age, gender and ethnic origin of the individual tested. Learners could also support their calculations of percent body fat by estimation using an appropriate nomogram. Statistical techniques should be conducted to determine the degree of correlation or difference that exists between the two prediction methods. Interpretation of percent body fat results can be achieved by comparing results to normative data, identifying strengths and areas for improvement.

Practical workshop 2

For the second practical workshop learners need to carry out anthropometric techniques to determine and interpret the anthropometric somatotype of an individual (P6), describing the results. The classic Heath-Carter (1967) anthropometric somatotype method should be employed.

Practical workshop 3

For the third and final practical workshop, learners need to predict and interpret the maximum oxygen consumption of an individual using two alternative experimental methods (P7). Interpretation of test results will include the application of statistical tests to determine the degree of correlation or difference that exists between the two prediction methods and consideration of how validity and reliability issues may have affected test results. Results should be compared against normative data and data for elite sports performers.

Grading criterion M1 builds on P4, and requires learners to explain the validity and reliability issues of the two anthropometric methods selected. Grading criterion M2 builds on P5 and to meet this criterion learners should conduct calculations to predict the percent body fat of an individual via two alternative methods and explain the results together with strengths and areas for improvement. In their explanations for M1 and M2, learners need to provide full details, together with supporting reasons. Examples should also be provided.

For M3, which builds on P6, learners need to explain the anthropometric somatotype results of the individual tested. The explanation will need to include how the resulting somatotype relates to sports performance. Grading criterion M4 builds on P7, and requires learners to predict the maximum oxygen uptake of an individual via two alternative methods and explain their aerobic fitness results.

Grading criterion D1 links to M1, and requires learners to analyse validity and reliability issues of the two anthropometric methods selected. Learners need to analyse each validity and reliability issue, considering how these could affect test results. For D2, which links to M3, learners need to analyse the anthropometric somatotype of the individual and analyse how the resulting somatotype impacts on the future sports performance of the individual.

For D3, which links to M4, learners need to analyse the maximum oxygen uptake results of an individual predicted using two alternative experimental methods of assessment. This will include a detailed analysis of results against published data from a variety of sources.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1, D1, P5, M2	Using Anthropometric Methods to Predict Percent Body Fat	You are working in a sports science laboratory, working with a team of researchers. Your first research task will focus on anthropometric methods. Explore health, safety and ethical issues associated with laboratory and experimental methods. Conduct two alternative anthropometric methods to predict the percent body fat of an individual.	Presentation and witness statement. Scientific report.
P6, M3, D2	The Anthropometric Somatotype	Follow standard procedures to determine the somatotype of an individual.	Scientific report.
P7, M4, D3	Use of Experimental Methods to Predict Maximum Oxygen Uptake	Your final task will explore alternative experimental methods for the estimation of maximum oxygen uptake. Predict the maximum oxygen uptake of an individual via two alternative experimental methods.	Scientific report.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Sport sector suite and the BTEC Sport and Exercise Sciences sector suite. This unit has particular links with the following unit titles in the BTEC Sport suite and the BTEC Sport and Exercise Sciences suite:

Level 3 Sport	Level 3 Sport and Exercise Sciences
Exercise, Health and Lifestyle	Sport and Exercise Physiology
Fitness Testing for Sport and Exercise	Research Methods in Sport and Exercise Sciences
Research Investigation in Sport and Exercise Sciences	Sport and Exercise Psychology
	Research Project in Sport and Exercise Sciences
	Exercise, Health and Lifestyle
	Fitness Testing for Sport and Exercise
	Applied Sport and Exercise Psychology
	Applied Sport and Exercise Physiology
	Research Investigation in Sport and Exercise Sciences

This unit links with the National Occupational Standards (NOS) for:

- Coaching, Teaching and Instructing at Level 3.

Essential resources

Access to a well-equipped gym and fitness suite with access to a range of kinanthropometric equipment is required, ie skinfold calipers (for example, Harpenden/Slimguide), Bioelectrical Impedance Analysis (BIA) machine, bone diameter calipers, multistage fitness test package, cycle ergometer (for example, Monark 824E). Learners will need to use the Heath-Carter (1967) anthropometric somatotype rating form and somatochart to conduct the anthropometric somatotype method. Learners should also have access to an appropriate area such as a sports hall to undertake other practical tests. Learners also need access to normative data for aerobic fitness interpretation and data for elite performers.

It would be beneficial for learners if they could access exemplar informed consent forms to aid their pre-test preparation. Access to a statistical package such as the Statistical Package for the Social Sciences (SPSS) would aid interpretation of data, although statistical tests stated in the *Unit content* (t-tests and Pearson's product moment correlation coefficient) can be computed by hand.

Employer engagement and vocational contexts

Following correct kinanthropometric technique to ensure validity and reliability of data is of utmost importance. Developing valid and reliable technique comes with experience. Centres may have a link with a local university where learners can use their exercise physiology laboratory facilities and kinanthropometric instrumentation for collecting data.

Practising techniques to gain experience and/or watching professionals undertake tests of this type would be invaluable in preparing learners for practical assessments and activities. Visits to a local fitness centre, centre of excellence or local university sports science laboratory would be beneficial.

Indicative reading for learners

Textbooks

Adams G M – *Exercise Physiology Laboratory Manual: Health and Human Performance* (McGraw Hill Higher Education, 2001) ISBN 9780072489125

Allen M B – *Sports Exercise and Fitness: A Guide to Reference and Information Sources* (Libraries Unlimited Inc, 2005) ISBN 9781563088193

Duquet W and Day J A P – *Kinanthropometry IV* (Spon Press, 1993) ISBN 9780419167709

Eston E and Reilly T – *Kinanthropometry and Exercise Physiology Laboratory Manual: Tests, Procedures and Data* (Routledge, 2008) ISBN 9780415437233

Eston E and Reilly T – *Kinanthropometry Laboratory Manual* (Routledge, 2008) ISBN 9780415466714

Foss M L – *Fox's Physiological Basis for Exercise and Sport* (McGraw-Hill, 2000) ISBN 9780072420692

Fox E L, Foss M L and Keteyian S – *Physiological Basis for Exercise and Sport – McGraw Hill International Editions Physical Education Series* (McGraw-Hill Education, 1998) ISBN 9780071158992

Heyes S, Hardy M, Humphreys P and Rookes P – *Starting Statistics in Psychology and Education: A Student Handbook* (Oxford University Press, 1993) ISBN 9780297821700

Heyward V H and Stolarczyk L M – *Applied Body Composition Assessment* (Human Kinetics Europe, 1996) ISBN 9780873226530

Lakshmi V – *Anthropometry: Sports Physique Evaluation* (Khel Sahitya Kendra, 2005) ISBN 97881752431 70

Malim T and Birch A – *Research Methods and Statistics* (Palgrave MacMillan, 1996) ISBN 9780333644393

Maud P J and Foster C – *Physiological Assessment of Human Fitness* (Human Kinetics Europe, 2005) ISBN 9780736046336

National Coaching Foundation – *Measuring Body Fat: A Guide to Body Fat and Its Measurement Using the Slimguide Caliper* (Coachwise Ltd, 1992) ISBN 9780947850883

Rees D G – *Essential Statistics, 4th edition* (Chapman and Hall, 2000) ISBN 9781584880073

Rosser M – *Sports Therapy: An Introduction to Theory and Practice* (Hodder and Stoughton, 1997) ISBN 9780340673201

Sharkey B J – *Fitness and Work Capacity (Report FS-315)* (Washington DC: U.S. Department of Agriculture, 1977)

SPSS – *Base 16.0 SPSS User's Guide* (SPSS Inc, 2007) ISBN 9780136036005

Thomas J R, Nelson J K and Silverman S – *Research Methods in Physical Activity* (Human Kinetics Europe, 2005) ISBN 9780736056205

Vincent W J – *Statistics in Kinesiology* (Human Kinetics Europe, 2004) ISBN 9780736057929

Wilmore J H – *Sensible Fitness* (Human Kinetics Europe, 1986) ISBN 97808801127 03

Journal references

Astrand I – Aerobic Work Capacity in Men and Women with Special Reference to Age, *Acta Physiologica Scandinavia* 49, 1960 (Suppl. 169)

Baun W B, Baun M R and Raven P B – A Nomogram for the Estimate of Percent Body Fat from Generalised Equations, *Research Quarterly for Exercise and Sport*, 1981, 52 (3): 380-284

Brozek J – Techniques for Measuring Body Composition, *Quartermaster Research and Engineering Centre*, (A.D <286506), 1959, Natick Mass, page 95

Durnin J V G A and Wormersley J – Body Fat Assessed from Total Body Density and its Estimation from Skinfold Thickness: Measurements on 481 Men and Women aged 16 to 72 years, *British Journal of Nutrition*, 1974, 32, 77-92

Heath B and Carter J – A Modified Somatotype Method, *American Journal of Physical Anthropology*, 1967, 27 (1), 57-74

Jackson A S, Pollock M L and Ward A – Generalised Equations for Predicting Body Density of Women, *Medicine and Science in Sports and Exercise,* 1980, 12, 175-182

Jackson A S and Pollock M L – Generalised Equations for Predicting Body Density of Men, *British Journal of Nutrition*, 1978, 40, 497-504

Lohman T G – Body Composition Methodology in Sports Medicine, *Physician and Sports Medicine*, 1982, 46-58

Journals

American College of Sport Medicine's Health and Fitness Journal

British Journal of Sports Medicine

Exercise and Sport Sciences Reviews

International Journal of Sports Science and Coaching

Journal of Applied Physiology, Nutrition and Metabolism

Medicine and Science in Sports and Exercise

Pediatric Exercise Science

Research Quarterly for Exercise and Sport

Websites

American College of Sports Medicine	www.acsm.org
British Association of Sport and Exercise Sciences	www.bases.org.uk
Human Kinetics	www.humankinetics.com
Sport Science	www.sportsci.org
Sports Coach UK	www.sportscoachuk.org
Top End Sports	www.topendsports.com

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	explaining health and safety issues associated with laboratory and experimental methods in sport and exercise sciences evaluating ethical issues associated with laboratory and experimental methods in sport and exercise sciences following test guidelines for the prediction of percent body fat of an individual using two alternative anthropometric methods describing validity and reliability issues of the two selected anthropometric methods carrying out calculations for the prediction of percent body fat of an individual using two alternative anthropometric methods, interpreting results and describing the strengths and areas for improvement carrying out an assessment of the anthropometric somatotype of an individual, describing the results following two different experimental methods to predict the maximum oxygen uptake of an individual, describing the results
Reflective learners	carrying out calculations for the prediction of percent body fat of an individual using two alternative anthropometric methods, interpreting results and describing the strengths and areas for improvement carrying out an assessment of the anthropometric somatotype of an individual, describing the results following two different experimental methods to predict the maximum oxygen uptake of an individual, describing the results
Team workers	carrying out calculations for the prediction of percent body fat of an individual using two alternative anthropometric methods, interpreting results and describing the strengths and areas for improvement carrying out an assessment of the anthropometric somatotype of an individual, describing the results following two different experimental methods to predict the maximum oxygen uptake of an individual, describing the results.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Team workers	practising anthropometric methods with their peers
Self-managers	completing practical workshops, testing their selected individual and collecting data.

Functional Skills – Level 2

Skill	When learners are ...
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	conducting statistical analyses researching exemplar informed consent forms researching exemplar health screening questionnaires
Manage information storage to enable efficient retrieval	recording anthropometric data results
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching for ethical issues case study
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	researching normative data for interpretation of results
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	producing laboratory reports
Bring together information to suit content and purpose	producing laboratory reports
Present information in ways that are fit for purpose and audience	producing laboratory reports

Skill	When learners are ...
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	statistically analysing data and interpreting results
Identify the situation or problem and the mathematical methods needed to tackle it	statistically analysing data and interpreting results applying percent body fat prediction equations to skinfold data
Select and apply a range of skills to find solutions	interpreting the anthropometric somatotype statistically analysing data and interpreting results
Use appropriate checking procedures and evaluate their effectiveness at each stage	statistically analysing data and interpreting results
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	statistically analysing data and interpreting results applying percent body fat prediction equations to skinfold data interpreting the anthropometric somatotype predicting maximum oxygen uptake
Draw conclusions and provide mathematical justifications	statistically analysing data and interpreting results applying percent body fat prediction equations to skinfold data and interpreting results interpreting the anthropometric somatotype predicting and interpreting maximum oxygen uptake
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	discussing health, safety and ethical issues
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	interpreting anthropometric data
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	producing laboratory reports.