LONDON SOUTH BANK UNIVERSITY

unit guide

SPORT & EXERCISE LABORATORY

SSS-1-210

Faculty of Engineering, Science & Built Environment

2008 / 2009

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1.0 UNIT DETAILS

Unit Title:	Sport & Exercise Laboratory
Unit Level:	1
Unit Reference Number:	SSS-1-210
Credit Value:	1
Student Study Hours:	150
Contact Hours:	36
Private Study Hours:	114
Pre-requisite Learning (If applicable):	Skills for Sports Science
Co-requisite Units (If applicable):	
Course(s):	BSc SES Sport & Exercise Science
Year and Semester	2007 / 2008 Semester 2
Unit Coordinator:	Mike Hibbs
UC Contact Details (Tel, Email, Room)	Room J214, Ext. 7962 hibbsm@lsbu.ac.uk
Teaching Team & Contact Details (If applicable):	Dave Cook 7992 cookdp@lsbu.ac.uk John Seeley 7038 seeleyj@lsbu.ac.uk Jo Bowtell 7959 bowteljl@lsbu.ac.uk
Subject Area:	Human & Exercise Science
Summary of Assessment Method:	100% CW

2.0 SHORT DESCRIPTION

There will be a series of weekly exercises based upon material taken from the sport and exercise science syllabus eg. physiology, nutrition & metabolism, biomechanics, anatomy & kinesiology. Specialist techniques and general skills are developed and consolidated.

3.0 AIMS OF THE UNIT

The unit aims to:

- Familiarise you with the apparatus and instrumentation routinely employed in sport and exercise science.
- To consolidate your knowledge of safe laboratory practice.
- To provide an environment which encourages an inquiring, investigative approach which will develop your competence and confidence in carrying out practical work.
- Further develop your literature searching.
- Further develop your report-writing skills.
- Provide opportunities for you to record quantitative data and to carry out analysis using statistical techniques.

4.0 LEARNING OUTCOMES

4.1 Knowledge and Understanding

- Demonstrate a greater understanding (from a practical perspective) of some physiological, psychological and biomechanical concepts in sport and exercise science.

4.2 Intellectual Skills

- Appreciate from practical experience, the value and limitations of the quantitative study of human function.
- Record, present, interpret and analyse data obtained from your laboratory experiences.

4.3 Practical Skills

- You will practice skills specific to certain instruments and relevant methodologies.

4.4 Transferable Skills

- Analysis of word-based and numerical information.
- Written communication skills, especially scientific report writing.
- Use of library and electronic resources to search for information.
- IT skills eg. word processing, spreadsheets, powerpoint

5.0 ASSESSMENT OF THE UNIT

The unit is assessed in two sections.
60%, Assignment 1
40%, Assignment 2

See section in this guide on reporting practical work.
Students are required to keep a copy of their work.

Assignment 1 - Hand in by Monday 30th March 2009.

60% of the Unit total mark is derived from a full practical report of the "Energy Cost of Walking" laboratory session.
Work should be word-processed and data presented using Excel. Work should be submitted to the Faculty Office, clearly marked for the attention of Mike Hibbs.

Assignment 2 – Hand in by Monday 4th May 2009.

40% of the Unit total mark is derived from an assignment based upon the sport psychology activities with Mark Allen.
Work should be word-processed and any data presented using Excel. Work should be submitted to the Faculty Office, clearly marked for the attention of Mark Allen.

6.0 INTRODUCTION TO STUDYING THE UNIT

6.1 Overview of the Main Content

A balanced laboratory practical programme is drawn from various disciplines of sport & exercise science ie. physiology, biomechanics, anatomy & kinesiology.
Students would expect to gain experience of respirometry and gas analysis; cardiovascular measurements; kinesiological analysis; biomechanical methods for determining the centre of gravity.

6.2 Overview of Types of Classes

The course will be presented in a series of weekly exercises. You should come prepared to write (pen & pencil), measure (ruler) and calculate (electronic calculator).

6.3 Importance of Student Self-Managed Learning Time

Students are expected to carry out approximately 114 hours of private study as part of this unit. This is the most substantial component of the unit time and it is the part which is often neglected. Lecturers will provide overviews and key points - your learning must also come from your reading. You are advised to spend a substantial amount of time reading the core text. **Success in the unit depends on your constructive use of private study time.**

6.4 Employability

The equipment and methodologies in this unit are an excellent introduction to industry standards in sport and exercise science.

7.0 THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

This guide is designed to help you structure your learning by providing an indicative structure and content for the unit. It is a guide and not a definitive statement of what you will be taught. We will try to follow the published schedule as far as possible, but there may be some variation as the unit develops and as we try to match the pace and content of the teaching to student needs.

End of Unit Review – your feedback is valuable.

It is University policy to obtain student feedback at the end of each unit. This is carried out using a standard form that should be completed and returned in a way that should maintain your anonymity. The results of the tick-box responses and any additional commentary are presented and discussed at the Subject Area Review & Planning Meetings that are held twice per year. Should it be required, members of staff at these meetings agree to modify

aspects of unit delivery and assessment for the next time that the unit will be presented (usually for the following year).

SUMMARY OF WEEKLY PROGRAMME

Tuesday mornings 10.00 – 1.00

19	27/1	JB, MA	All class	T806	Literature searching on intranet and internet
20	3/2	JB, MA	All class	T806	Literature searching on intranet and internet
21	10/2	JB, MA	All class	T806	Powerpoint
22	17/2	JS	All class	J212	Statistics Referencing
23	24/2	MH JS	A B	J202 J212	Energy Cost of Walking Referencing
24	3/3	MH JS	B A	J202 J212	Energy Cost of Walking Referencing
25	10/3	MH JS	A B	J202 J212	Physiology Practical Statistics
26	17/3	MH JS	B A	J202 J212	Physiology Practical Statistics
27	24/3	MA	All class	J202	Sport Psychology activity
28	31/3	MA	All class	J202	Sport Psychology activity
VAC					
32	28/4	DC	All class	E257	Centre of Gravity Measurements
33	5/5	DC	All class	E257	Kinesiological Analysis

8.0 LEARNING RESOURCES

8.1 Core Materials

Data obtained from some of the practical sessions will be posted on the Sport & Exercise Laboratory Blackboard Site.

Jones A., Reed R. & Weyers J. (2003) *Practical Skills in Biology, 3rd ed.* Longman
This book has 66 short chapters. Chapters 1 – 20, 25 – 26, 61 - 66 are relevant to sport & exercise science students.

8.2 Optional Materials

Some subject-specific texts that should help your general understanding:

Tortora G.J. & Derrickson B. *Introduction to the Human Body: The essentials of Anatomy & Physiology. 7th ed.* 2007

Widmaier E.P., Raff H. & Strang K.T. (2006) Vander's *Human Physiology: The Mechanisms of Body Function, 10th edition.* McGraw Hill.

Luttgens K. and Hamilton N. (1997) *Kinesiology: Scientific basis of human motion.* Dubuque IA, Brown & Benchmark.

Specific reading material will be provided as appropriate with individual practical exercises.

Name:

Sport & Exercise Laboratory Unit: 'Walking' Practical Report

MARKING SCHEME	Marks Available	Marks Awarded
The report contains all the sections below	3	
Title, Aims	5	
Introduction	20	
Methods (acknowledges schedule)	2	
Results	20	
Discussion	35	
Summary / Conclusion	10	
References	5	
	Total 100	

Up to 10 Marks will be deducted for unsatisfactory Literacy/Use of English/Presentation

REPORTING PRACTICAL WORK

This handout is designed to make you think carefully about writing up Practical Reports. It contains useful information on the presentation of the Report and particularly on presentation of data, tables and graphs.

A. The form of the Practical Report

A Practical Report should have the following sections in the given order.

Practical Report

Title
Self-explanatory.

Aim or **Hypothesis**
This is brief but important. It answers the question: "Why did you do this work?"
If you are doing an experiment you will likely have an hypothesis. If you are running an exercise test, you will have an aim but likely no hypothesis.

Introduction
This section relates the aim/hypothesis of the experiment to the background theory on which the experiment is based. For example, in a cardiorespiratory practical on exercise you would likely describe the need for oxygen to be delivered to muscles for maintenance of ATP levels in continued exercise, and the roles of respiratory, cardiovascular and muscle tissue in achieving this. You may also make commentary in this section on the reasons for using a particular method for the practical work and the principles on which that method is based.

Methods
A detailed explanation of equipment and chemicals used and the methods employed in the experiment. This should be accurate enough so that the experiment ***could be repeated exactly*** *by another researcher in order to evaluate the repeatability of results, or to draw comparisons with different populations. The handout you obtain prior to the experiment and the notes you make during the experiment will be the basis for this section. There is no need to rewrite the supplied instructions, but they must be included with your Report so that the Methods section is a complete record.*

Results
Systematic presentation of your data in tables and graphs. Attention to detail is important here.
This section should also include a description of the notable features of your results. For example, "The heart rate rose sharply from a value of 68 bpm at rest to 145 bpm after four minutes steady state exercise. Thereafter, the heart rate rose less steeply and a maximum of 151 bpm was recorded at the end of the six-minute exercise period (Fig. 1)."

Don't fall into the trap of discussing the results, the text in this section should be descriptive only.

Discussion

This is a crucial section and accounts for a lot of marks. There are two important sub-sections:

*1. **discussion of your data;***

*2. **evaluation of your experimental work**.*

The data discussion sub-section should contain an interpretation of your data relative to the theoretical background (e.g. Does the pattern of your data fit in with known physiology? Do transition points occur as you expect them to?) This sub-section should also contain direct comparison of your values with "standard" values (e.g. Are your heart rate values appropriate for someone of your subject's age and fitness undertaking this level of exercise?)

*The **evaluation** is a discussion of "how the experiment went", noting points for improvement in approach or technique for later experiments of this type. It is important to identify the major problems here and not simply to pick fault with everything that went on.*

Conclusion(s)

*A brief-but-important section. Each conclusion (of which there will be very few in a normal experiment) is a precise, one-sentence, scientifically-justified statement of **findings**.*

For example.

"The $V^{\bullet}O_2max$ value for a 23-year-old male subject was determined to be ...ml kg^{-1} min^{-1}"

"Within experimental error, heart rate was determined to be linearly related to work rate for steady-state exercise on a cycle ergometer."

*You should **not** include general statements about gaining useful experience through doing the experiments, and such like.*

References

At Level 1, only a limited number of references are needed. Likely most of the references will be to textbooks.

B. Steps in the production of a Practical Report.

1. Collecting materials

The first step in the process is to collect together carefully all the material you recorded in the laboratory. This will include data, methods notes and mistakes or limitations of the practical work itself. Be careful to eliminate irrelevant material, **but** remember that negative results are extremely important. Negative results still tell you something about the experiment and should be interpreted with reference to the experimental procedures and limitations, as should positive results.

2. Planning

Each section of the Report needs its own plan. Each plan requires careful consideration. You should try to organise each section into a series of subsections (not sub-headings), which you will link together to form the overall section. For example, the Introduction may be structured as follows.

A clear re-statement of the **aim or hypothesis of the experiment**

For example, "The aim of this experiment is to evaluate the response of ..."

Theoretical background to the work

For example, content such as ... ATP and oxygen required for sustained movement; the ability to replenish ATP in sustained exercise; the process of oxygen transport to muscle and the systems involved.

Summary or hypothesis

A statement about what you expect to observe in the experiment in the light of the theoretical background presented.

3. Writing

Once the planning is done the next step is to write. **Always write in the past tense and in the passive**.

✓ "Measurements were taken at 5-minute intervals."

NOT

✗ "We took measurements at 5-minute intervals."

✗ "Measurements are taken at 5-minute intervals."

The order in which sections are **written** is not crucial. However, the following is a good order to follow as it ensures that you see some progress quickly.

Materials and Methods

Most of the information is already available to you.

Results

Jot down some ideas for the Discussion while you work on this section.

Introduction

As above.

Discussion

As above.

References

4. Revising the text

Once you have completed the first draft, revise your text and make sure you have included all the information required. You can do this by referring back to the attached table summarising the content of each section of the report. You should carefully proof-read your work, or, better still, get a friend to help you with this.

C. Submitting your work

Ensure that you complete your work by the deadline set by the Unit Co-ordinator. Failure to do so without an extension will lead to major loss of marks. If an extension is required, you **must** comply with the regulations stated in the Unit Guide. **Remember that you must always keep an additional copy of your work.**

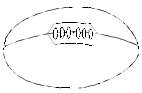
D. Data manipulation, presentation and interpretation

General guidelines

- Avoid presenting the same data in several ways. Normally data should appear once in a table and once in a graph at most.
- Graphs should be cross referenced to the mean data table used to plot them.
- Graphs should show responses clearly.
- Tables and graphs should be in the main body of text, apart from **large** tables of "raw" data which should be put in an Appendix. You can use mean data tables to condense data.

Careful processing of data is essential if you are to present a professional scientific report. There are a number of key steps, as follows.

- Organise the data by arranging it in tables.
- Adjust the raw data by rounding it to a consistent number of decimal places/significant figures.
- Calculate derived values from the raw numbers, e.g. calculate mean values.
- Display the manipulated data as a graph or graphs (see below).
- Look for patterns in the graphs. For example, for line graphs:
  note the shape of each individual line,
  compare the shape of data lines derived under different conditions,
  note the presence of exceptions (outliers) to the main pattern.
- Describe notable features of the data, graphs in the Results section.



- Interpret the line shapes and outliers (or bar graph values and their patterns) with reference to the underlying theory for the experiment and provide your written description of these interpretations in the Discussion section.

Preparing tables

In presenting data in tables, clear structure to the table is important. A checklist for table presentation is as follows.

- A reference number for the table and its title, normally below the table.
- Headings for each column and row with appropriate abbreviations and units of measurement.
- Data quoted to the number of significant figures appropriate the precision of the measurements. (Mean values and standard deviation values included as appropriate.)
- Rulings to emphasise the experimental groups and distinguish them from each other.

Example

Subject	Subject 1			Subject 2		
Work rate (watt)	f_C (bpm)	f_B (brpm)	RPE	f_C (bpm)	f_B (brpm)	RPE
50						
100						
150						
200						
250						

Table 1.1 Subject data for heart rate, breathing frequency and rating of perceived exertion during incremental steady-state exercise.

Variable (Mean (SD))	f_C (bpm)	f_B (brpm)	RPE
Work rate (watt)			
50			
100			
150			
200			
250			

Table 1.2. Mean data for heart rate, breathing frequency and rating of perceived exertion during incremental steady-state exercise.

Preparing graphs

The preparation of graphs is especially important. You need to decide on the best graph format to use, i.e. line graph, histogram, pie chart etc. The type of data will often dictate the format of the graph. A useful procedure for graph plotting is as follows.

- Plot graphs directly from data tables.
- Decide on the graph format.
- Decide which variable will be plotted on the x- and which on the y-axis, i.e. which is the dependent and which the independent variable.

(Read up Maths Help in the Sciences Good Study Guide *for advice on this.)*

- Select scales for each axis to allow clear presentation of data.

(Graphs need be no larger than one third A4 in size, i.e. 17cm across by 10cm down.)

- Use a uniform scale, i.e. equal distances on the graph representing equal numerical

distances.

*(If you are using Excel to plot graphs, you can go **badly wrong** if you make the wrong graph choice. For line graphs, the safe choice is the XY (Scatter) graph.)*

- Put in axis labels and units of measurement.
- Plot data points so that co-ordinate values can be derived from the graph.
- Use readily distinguishable symbols if there is more than one line on the graph (and give a key to the symbols).
- Join adjacent data points by straight lines.
- For a line graph, you may also or alternatively draw a line of best fit through the points, if there is **theoretical or practical** justification for doing this.
- Put in a title (with a reference number) at the top of the graph.

(This should indicate important features of the experiment and not merely repeat the axis labels.)

1.0 EXAMPLE

Figure 1.0 Heart rate response to steady-state exercise