LONDON SOUTH BANK UNIVERSITY

Module guide

Scientific Skills

Module Ref. SFB_4_100

Blackboard site: Scientific Skills

Faculty of Engineering, Science and the Built Environment

2010/11

become what you want to be

CODE OF CONDUCT
FOR
LECTURE THEATRES AND CLASSROOMS

The behaviour and conduct in lecture theatres and classrooms should be conducive to teaching and learning for all participants.

Students not adhering to this code will be asked to leave and persistent offenders may be subject to the University's disciplinary procedures.

A lecturer has the right to end a teaching session if this code is significantly breached.

	Code
1	**Students are expected to show consideration towards others at all times.** Talking should be kept to a minimum when a lecture is in progress. Shouting or other forms of distracting behaviour of any kind is not permitted.
2	**Students will not be allowed to enter the lecture theatre or classroom 15 minutes after the scheduled start.** Latecomers should wait until a *scheduled break* before joining the class.
3	**Entering and leaving a room during a lecture is not allowed.** Students should not leave the room during a lecture. The breaks between lectures are the time to use the toilet facilities. You will be told when a break begins .
4	**Your attention is required throughout the lecture.** Students who cannot give the lecturer their full attention, or who prefer to do something else, should not be in the lecture and will be asked to leave.
5	**Mobile phones and MP3 players *must* be switched off.** You will need to bring a proper calculator to the teaching sessions.
6	**You are not allowed to record the lecture without the lecturer's permission.**
7	**Browsing the internet using a laptop computer during a lecture is not permitted unless advised by the lecturer / tutor.**
8	**Wait quietly outside a room when a lecture or examination is in progress.**
8	**Tutorials require students to participate in discussions, exercises or other activities.** If you do not intend to participate, or have not done the preparatory work, do not attend.
9	**Students are forbidden from operating the audio visual equipment in the teaching rooms.**

10	**Computer terminals and other equipment should be used in the appropriate manner and only to meet the learning outcomes of the session.** Terminals should not be used during a class for accessing material not relevant to the exercise.
11	**Eating during a lecture is not permitted.**
12	**Remove your waste when you leave.**

L.S.B.U. PERSONAL DEVELOPMENT PLANNING
MODULE MAPPING EXERCISE LEVEL 1

QAA REQUIREMENTS	SCIENTIFIC SKILLS		
	Lectures	**Laboratories**	**Other**
1	Importance of contact with personal tutor. Meet in induction week	Personal tutors (and other staff) available to give advice and assistance.	Receive feed back on English diagnostic essay from personal tutor in week 3 semester 1
2	Set of lectures designed to promote Personal Development Plan Knowledge of how to read and write a scientific paper	Basic good Microbiological and laboratory Practices taught. Team work in laboratory classes	Dyslexia, English and maths diagnostic tests done in week1-3 Need for help identified and either the personal tutor or Caxton House informed
3	Microbiological Chemical and computing classes Special tutorials arranged as needed e.g. maths	Practical techniques are learned for microbiology, biochemistry and computing	
4	Not applicable at this level	Not applicable at this level	Not applicable at this level
5			Personal development folder given to chart progress during the whole course
6	Not applicable at this level	Not applicable at this level	Not applicable at this level
7			Course blackboard site contains links to range of resources to aid in personal development.
8		Learning to work in teams for practical classes	
9			Course blackboard site contains links to range of resources to aid in personal development.
10	Personal development folder given to chart progress during the whole course		Blackboard site available.

MODULE LEADER NAME: Larry Richmond MODULE LEADER SIGNATURE:
DATE: 01/08/2014

Please Note

It is important to attempt to pass **all** assessments at the first attempt.

Students do not have a right to referral - this can only be given by the Examination Board when it considers your entire collection of marks at the end of each academic year. Additionally, you should note

1. That a referred element of assessment (coursework or examination) will be capped at 40%
2. That you will be allowed only one attempt at referral
3. That a failure in a referral may require you to re-take the entire module, attend for a second time and take all assessments, even those elements you may have previously passed. You will be charged again for that module.
4. The University regulations do not allow you to progress to the next level, or be given a qualification, with a number of modules outstanding or with certain modules outstanding.

If you need any clarification you should consult your Course Guide or speak with your personal tutor, year tutor or Course Director.

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Table of Contents

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

1.0 MODULE DETAILS

Module Title:	Scientific Skills
Module Level:	4
Module Reference Number:	SFB_4_100
Credit Value:	2 Credit = 30 CATS points
Student Study Hours:	300 hrs
Contact Hours:	150 hrs
Private Study Hours:	150 hrs
Pre-requisite Learning (If applicable):	None
Co-requisite Modules (If applicable):	None
Course(s):	Bioscience and Food
Year and Semester	2008/9Semester 1
Module Coordinator:	Dr Larry Richmond
UC Contact Details (Tel, Room, Email)	Tel: 020-7815-6229 Room B141 larry.richmond@lsbu.ac.uk
Teaching Team & Contact Details	**Contactable staff by subject area** **Microbiology** Dr Michael Byford Room B150 tel: 020-7815-7994 byfordmf@lsbu.ac.uk Dr Neil Morgan Room B142 tel: 020-7815-7956 morgannl@lsbu.ac.uk **Chemistry** Dr John Acord Room B140 tel: 020-7815-7922 acordj@lsbu.ac.uk Dr Delia Ojinnaka Room B144: tel: 020-7815-6255 ojinnad@lsbu.ac.uk Dr Kenneth Spears Room B143 tel: 020-7815-8140 spearsk@lsbu.ac.uk **Lectures/Tutorials** Dr Anne-Maria Brennan Room B138 tel: 020-7815-7929 brennan@lsbu.ac.uk

Subject Area:	**Bioscience and Food**
Summary of Assessment Method:	**An ePortfolio will be produced containing ALL of the following work:**

Laboratory Skills

General lab skills

Your lab book (filled in for every lab session)

Microbiology

Attendance profile
Pre and post Lab booklets

Chemistry

Attendance profile
Pre and post Lab booklets
- marked each week in the class
Two formal Lab reports.

Biology or Food

Lab report

Biomolecules

Two formal lab reports

Computing

All Computing exercises

Study Skills

2 English essays
Diagnostic Maths test
Dyslexia test

Tutor feedback forms

Produced at meetings with your personal tutor.

Your response

1 page stating what you did about any area of the above that was identified as needing extra support.

Final module mark will be linked to attendance:
(mark/%attendance)/100 = final mark

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2.0 SHORT DESCRIPTION
SHORT INTRODUCTION TO THE MODULE

This Module explores the basic skills that all scientists need. The largest component of the Module is the laboratory work (50%), which gives practical experience in microscopy, microbiology and chemistry. The Computing workshops (30%) deal with the use of e-mail and the Internet, word processing and spreadsheet software packages. The final element is study skills (20%).

Employers have long complained that many students graduating from British universities lack basic skills in reading, writing, information technology and problem-solving skills. Universities complain that students entering higher education are ill-equipped with the skills required for successful study. This module aims to ensure you have those skills.

Topics dealt with include taking lecture-notes, literacy and essay writing, use of calculators and library facilities, working with computers, problem-solving and time management skills, as well as laboratory work. Some of you may feel that you have little or nothing to learn about these topics and that may well be true! It is your responsibility to make sure that you are suitably competent in each of these areas and, if you are not, to make use of all the facilities available to remove any deficiencies. Some students have, in the past, taken themselves off on creative writing courses to improve their essay writing skills. Others have need of maths courses to upgrade their numerical skills. At Caxton house, all students at the University can make use of the free special courses.

It is up to you to make the best use of your time and of the facilities we can offer you. The module is designed to encompass 150 hours of study, of which a maximum of 75 hours are class contact time and 75 hours are private study. We will give you some work to do during your private study time; it is up to you to decide how best to use the remaining time to your advantage.

In this Module Guide we spell out the aims and outcomes (what you should be able to do by the completion of the module). You should use these regularly to check on your own progress.

Note that the complete documentation for this module consists of:
Module Guide;
Microscopy and Microbiology Laboratory Schedules;
Microscopy and Microbiology Results Notebook;
Chemistry Laboratory Schedules;
Chemistry Laboratory Results Notebook;
You should make sure that you obtain a copy of each of these documents.

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3.0 AIMS OF THE MODULE

- To provide an environment which encourages an inquiring, investigative approach and which develops competence and confidence.
- To consolidate your knowledge of safe laboratory practice and to encourage you to develop competence in specific basic laboratory techniques.
- To enable you to use correctly analytical methods and procedures appropriate to the subject area material.
- To review the necessary background in mathematics, computing, data handling and quantitative skills to support other level 1 and 2 modules in the course.
- To encourage the development of the necessary skills for effective life-long learning.
- To increase your confidence and competence in the full range of communication, study and problem solving skills.

4.0 LEARNING OUTCOMES

4.1 KNOWLEDGE AND UNDERSTANDING

On completion of this module you should be able to:

Computing and Quantitative Skills

- use electronic mail and the internet
- use word processing packages and spreadsheets to produce simple documents.
- use hand calculators effectively and reliably.
- express results of calculations to the required accuracy.
- use the SI units of measurement and be able to convert between these units and other units of weight, volume, temperature and pressure.
- apply mathematical techniques to the analysis of data generated in the laboratory.

4.2 INTELLECTUAL SKILLS

- Develop self-criticism and recognise self-deficiencies and the skills to sort them out by yourself or with aid of the university support services.

4.3 PRACTICAL SKILLS

Laboratory Skills

- routinely apply health and safety precautions in the laboratory.
- work effectively, both individually and in a group, to follow a schedule.
- set up an optical microscope for maximum resolution.
- use the microscope to determine the size of cells and to draw a tissue plan of a biological material.
- grow microbiological cultures using appropriate media.
- determine the number and types of micro-organisms in a culture.
- demonstrate accurate and reliable technique in gravimetric and titrimetric methods of analysis

4.4 TRANSFERABLE SKILLS

Study Skills

- take useful notes from lectures and core reading material
- develop and carry out a workable personal plan to meet deadlines and carry out exam revision
- find references in the library and use the electronic databases
- write up laboratory reports in the required format
- use your problem-solving skills in a wide variety of situations

5.0 Assessment

To pass this module you **must**:

1) have passed **ALL** of the components listed below

Numeracy and Literacy (20%)

- Completed Dyslexia test (done in week 1 or 2)
- two essays (one in enrolment week, the 2nd in week 9) to assess your levels of literacy.
- two of your numeracy/ maths tests (one early in the semester and the second after you have completed the maths tutorials.

Laboratory Skills (40%)

Microbiology Labs

- Attendance – 100% failure to attend will require explanation (doctor's note or equivalent) as you are learning new skills.
- Pre and post Lab booklets – marked each week

Chemistry Labs

- Attendance – 100% failure to attend will require explanation (doctors note or equivalent) as you are learning new skills.
- Pre and post Lab booklets – marked each week
- Two formal Lab reports. Both reports will be used as evidence of **competence in computing** – word processed, excel spreadsheets etc.

Biomolecules Labs

- Attendance – 100% failure to attend will require explanation (doctors note or equivalent) as you are learning new skills.
- Pre and post Lab booklets – marked each week
- Two formal Lab reports. Both reports will be used as evidence of **competence in computing** – word processed, excel spreadsheets etc.

Computing (20%)

- All computing exercises completed.

2) Submitted a PDP ePortfolio containing ALL of the following work: (20%)
   - Second essay
   - All computing exercises
   - 2 chemistry lab reports
   - 2 biomolecules lab reports
   - Evidence of meetings with personal tutor
   - A brief statement stating how you have found the year and what you did about any areas that were identified as needing extra support.

The list above is the **minimum** required to pass this module. You may include any other work or documentary evidence (such as certificates of learning from Caxton House) that you feel are relevant to your academic and personal development over the first semester at LSBU.
This ePortfolio **MUST** be made available to **BOTH** your personal tutor **AND** the module leader.

Submission Deadlines

Your ePortfolio **MUST** be available for viewing, containing **ALL** semester 1 work, by Monday 9th January 2012 and containing **ALL** semester 2 work by Monday 23rd April 2012

6.0 Feedback

Feedback will normally be given to students within 15 working days after the submission of an assignment.

7.0 INTRODUCTION TO STUDYING THE MODULE

7.1 OVERVIEW OF THE MAIN CONTENT

INDICATIVE SYLLABUS CONTENT

- **Laboratory Skills (50 % of module time)**
  Safety in the laboratory
    - School laboratory safety regulations. Clothing and protective wear. Working with gases, liquids, chemicals, micro-organisms. Accident and emergency procedures.
    - Clearing away at the end of the session, reset or store apparatus, dispose of waste products.
    - Follow and apply instructions. Work individually and in small groups. Record results accurately.

  Optical microscopy
    - Design and component parts of an optical microscope.
    - Calculation of resolution and magnification. Micrometry.
    - Preparation of slides of food or biological material.
    - Drawing and photographic techniques to record images.
    - Introduction to image analysis.

  Microbiological practice
    - Liquid and solid media for the growth of aerobic and anaerobic organisms. Viable cell counts, most probable number, microscopic and turbidometric estimations.
    - Distinguishing characteristics of micro-organisms; colony morphology, growth characteristics. Isolation of micro-organisms from the environment, using aseptic technique and safe practice.
    - Safe disposal, disinfection and sterilisation, safety cabinets, prevention of aerosols.

Elementary analytical procedures.

- Gravimetric and titrimetric analysis, pH measurements. Measurement of temperature, pressure, flow, mass and volume. SI units, molarity, Avogadro's number, balancing chemical equations.

Reporting results

- Structure of a laboratory report and presentation of data. Scientific expressions and format.

- **Computing and Quantitative Skills (30% of module time)**

Computing

- Use of email and word processing packages. Load software or access from the system. Type a report, save and print a properly laid out report using Microsoft *Word*.
- Use of spreadsheets (*Excel*) for recording, presenting and analysing data.

Mathematics

- SI units. Transposition and solution of linear, simultaneous and quadratic equations. Graphical representations of data. Linear and logarithmic axes.
- Applications of differentiation to the manipulation and interpretation of experimental data.
- Use of the South Bank University Produced Refresher in Maths CD for self study

- **Study Skills (20% of module time)**

Study and information gathering

- Organisation of time. Planning and evaluation of courses of action. The role of a diary/portfolio/profile as a tool for monitoring progress.
- Organisation and use of libraries. Information classification and cataloguing. Use of electronic databases for literature retrieval.
- Skimming, scanning, fast-reading, note-taking techniques. Notes from texts and lectures, summaries.
- Preparation for examinations. Revision planning and preparation, revision methods. Types of examination papers, examination technique.

Communication skills

- Essay writing; interpretation of questions, planning structure and format.
- Rational argument and evidence.

Personal Development Planning

- An important component of this module is the Personal Development Planning (PDP) portfolio which you will compile. This will be explained in detail in the lectures. **It is important that you keep ALL of your course work, including diagnostic tests, in a folder.** This will form the basis of the final assessment of this module. (See 5.0, above).

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7.2 OVERVIEW OF TYPES OF CLASSES

The module will involve formal lectures (one a week), microbiology and chemistry classes, computer classes and tutorials. The timetable for each strand of the courses is shown below but may change depending on student numbers. This will be done to give approximately the same number of students in each class.

7.3 IMPORTANCE OF STUDENT SELF-MANAGED LEARNING TIME

In this module this is vital, as this module prepares you for the future modules in semester 2 and years 2 and 3. The recommended text is:
Reed. R., Holmes. D., Weyers. J., Jones. A*. Practical Skills in Biomolecular Sciences* 2nd edition Pearson ISBN 0 13045142 8 2003
It is well worth buying, as it will be useful for the entire course.

In the University there is a range of **free** help and information services managed by the Centre for Learning Support and Development (http://www.lsbu.ac.uk/learningsupport/):

Skills for Learning Unit offers free help on English, maths and study skills.
Disability & Dyslexia Support is VERY good and you should take advantage of it if you think you may have a problem.
Library – books, electronic resources, information advisors, old examination papers, internet access, etc.
Learning Resource Centre – (LRC) on Borough Road provides free computer access for all students and staff, as well as printing, scanning and photocopying facilities.

All of these can accessed from the Student Gateway on the University web site
http://www.lsbu.ac.uk/current.student/

There is also a system of electronic learning called BLACKBOARD, which you have access to. This module supports a blackboard site and you should be automatically enrolled on this site when you are **fully** enrolled. If you have any problems accessing this site please contact the module leader.

7.4 EMPLOYABILITY

This module aims to equip you with the basic skills you will require, whatever field of employment you ultimately enter, such as literacy, numeracy and IT. In addition, you will acquire the basic skills specifically required for employment in a scientific environment.

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8.0 THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

8.1 TIMETABLE OVERVIEW

The timetable and any changes will be posted on the Blackboard site for this module. Please check the site regularly.

Check your course code on the timetable carefully. With the exception of the main lectures, which students on all courses attend together, there are different times for the various components of the module, for students on each course.
You must attend the session timetabled for your course. Registers will be taken at each session.

8.2 LABORATORY WORK PROGRAMME

All of the laboratory sessions for this module start promptly either at 10.00 or at 14.00. You **must** be in the lab and ready to start work on time.

AFTER THE SAFETY TALK HAS BEEN GIVEN, **YOU WILL NOT BE ADMITTED** TO THE PRACTICAL CLASS. This is for your safety and the other students and staff.

COMPUTING WORKSHOP PROGRAMME

The main aim of the Computer Workshops is to ensure that everyone is able to use the University's email system, can use the internet, and reaches a minimum satisfactory standard in the use of the software packages *Word* and *Excel*. Many of you may already have had experience of using one or more of the software packages involved here, and - provided you can demonstrate to us that you are indeed competent, **by completing the workbook** - there is no need for you to attend the workshops concerned with the particular software program. However, you are still free to use the computers during the scheduled workshop sessions if you wish to.

Classes take place on various days and times depending on which student group to which you have been allotted. Although staff are generally only available for the first two hours of each Workshop session, the computer rooms are reserved for our use for the full three hours for those who want more time at the terminals.

Please note that the schedule below is *indicative* only; the subjects covered in particular sessions may be varied depending on the previous knowledge and progress of each student group. You will be informed of any major changes, however. **Please check the Blackboard site, where any changes to the timetable will be posted.**

Week Number	**Description of Session**
1	Introduction to the course. User registration and introduction to blackboard. Introducing Windows; file operations, USB memory stick use, etc
2	Use of Internet and email Health & Safety issues Introducing *Word* **A first opportunity to take the *Word* test**
3	*Word* workshop
4	*Word* workshop
5	*Excel* Workshop **A first opportunity to take the *Excel* test**
6	*Excel* workshop
7	*Excel* workshop
8	*Excel* workshop
9	*Excel* workshop

Summary of Computing Skills Required

General

Formatting disks
Backing up work
Virus awareness
Health & Safety awareness
Data protection, security awareness

Email

Logging on to the NT network
Sending and receiving email messages
Managing messages (keep, discard etc)
Creating a signature
Appending files

Word

Choose fonts, font sizes, bold, italic, justification, obtaining Greek letters
Tailor control bars, superscripts, subscripts, underline (once, twice)
Text boxes, tables, word count, spell check
Headers, footers, page numbers
Use of proofing tools (spell-check, Thesaurus, search & replace)
Use of equation editor
Working with different versions of documents

Excel

Inputting data; writing equations
Copying and moving data; copying formulae
Use of functions (sum, count etc)
Using named constants
Graphical presentation of data
Producing best-fit straight lines
Linking data; exporting *Excel* objects into *Word*

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8.3 THE STUDY AND QUANTITATIVE SKILLS PROGRAMME

The Study and Quantitative Skills Programme for Scientific Skills is taught by a series of lectures and **tutorials and by self-study of the CDrom supplied by the University. There will be a one-hour lecture each week and a 1-hour tutorial each week.**

- **Lectures**

Students on all schemes will attend the lectures together.

- **Study Skills Tutorials**

There will be four groups for the study skills and quantitative skills tutorial programme. The groups are organised on a scheme basis so that there are about 20 students in each group. Details on group organisation, room numbers and timetable will be given on the timetable above.
Details of the topics to be covered in the classes and the work that you are required to do in your private study time are given below.

Role of Your Personal Tutor
Your Personal Tutor will probably be a member of the academic teaching staff for Year One. You are **required** to have 2/3 meetings during the semester. **It is important that you attend these meetings and that your attendance is recorded.**

- The first meeting should take place as soon as possible but before the end of eek 2. This session will focus on an initial diagnosis of strengths and weaknesses.

- The second meeting will take place in Week 4 to receive feedback on your essay (titles given out in enrolment week).

- The third meeting will take place in Week 11 or 12 to receive feed back on the essay done in week 9.

The aim of these sessions is to discuss your progress on your course. Your progress will be monitored and action plans devised.

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8.4 LECTURE PROGRAMME SUMMARY

Venue: Room B230, Borough Road Building.

Please note that the schedule outlined below is *indicative* only. The precise coverage in each session may change in the light of the group's previous knowledge and progress. You will be informed of any major changes, however.

Week 1 *General teaching session* *LR*
Introduction to the Module: how it will be taught. What you can, and cannot, expect from the tutor. What is expected from you. Assessment systems. Adult Dyslexia Test. Computing questionnaire
Practical skills in Biomolecular Sciences p 3-33

Week 2 *General teaching session* *TBC*
Maths diagnostic test
Submission of essay from the induction week

Week 3 *General teaching session* *TBC*
Examination preparation, rules,
Mitigating circumstances

Week 4 *Meet personal tutor* *All personal tutors*
Feedback on work submitted in week 2
(You **must** ensure that you arrange a time during this week to meet your personal tutor)

Week 5 *General teaching session* *LR*
Graph drawing for laboratory reports

Week 6 *General teaching session* *LR*
Correct use of Blackboard and Online Study Resources

Week 7 *General teaching session* *A-MB*
Personal Development Planning and time management

Week 8 *General teaching session* *A-MB*
Plagiarism; Lecture note taking

Week 9 *General teaching session* *TBC*
Good scientific writing - essays

Week 10 *General teaching session* *TBC*
Good scientific writing - reports

Week 11 *General teaching session* *TBC*
Rational argument - 1

Week 12 *General teaching session* *TBC*
Rational argument - 2

8.5 TUTORIAL PROGRAMME

Tutorial Week 1
Getting to know your tutor and the other participitants in your group. Give a 5-minute talk about yourself, where you are from, why you chose South Bank, your hobbies, where you live in London, etc. The reason for doing this is that many job interviews now involve the candidate giving a talk, so you can learn these skills in a friendly safe environment.
Fill in a skills audit

Tutorial Weeks 2- 3
Maths

Tutorial Week 4
Meeting with personal tutor to receive feedback on English essay and discuss progress to date.

Tutorial Weeks 5 - 10
Maths

Tutorial Week 11
Meeting with personal tutor to discuss progress to date.

Tutorial Week 12
Maths

Tutorial Weeks 16
Meeting with personal tutor to discuss progress to date.

It is important that you ensure that you meet with your personal tutor on the weeks indicated and that the meeting is recorded on the tutor report form, which **MUST** be included in your PDP folder.

Note: Your tutor will not necessarily be available at the same time as your tutorial. It is your responsibility to contact your tutor and arrange a meeting time.

Tutor Report Form.

Tutor name:	
Student name:	
Date:	

Tutor's comments

Signature:

Student's comments

Signature:

8.6 DO YOU FEEL THAT YOU NEED MORE HELP THAN YOU HAVE RECEIVED SO FAR?

There are various things you can do. If you feel that either your written or spoken English may be potential problems, then you should certainly discuss your difficulties with your Personal Tutor or the Module Leader.
In addition, you could contact the Centre for Learning Support and Development (http://www.lsbu.ac.uk/learningsupport/) for advice on a range of topics including:

Careers & Employment
Disability
Dyslexia
English
Extended Degree Programme
Maths
Multifaith Care
Personal & Money Advice
Personal Development Planning
Study Skills
Summer Courses

- **Refresher in Maths**

This CD is intended to bring all students up to certain level of mathematical ability. We want you to remember HOW to do maths so calculators will NOT be used so you can understand what you are doing.
See Appendix 1 for contents of CD
See Appendix 2 for an example of the achievement test.

- **English**

Study one of the text books on English language available in the Perry Library. Two suggestions are:

Temple M., *A pocket guide to written English*. Library number 428.24 TEM.
Collinson D., *Plain English*. Library number 808.042.

If you feel that you need more help with mathematics, then help is available at Caxton House. Courses are held regularly on defined topics (e.g. there is one session on manipulating equations), which you can attend, just by dropping in at the appropriate time and day. One-to-one sessions can also be arranged with staff at the Centre.

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9.0 LEARNING RESOURCES

9.1 CORE MATERIALS (IN LIBRARY)

Reed. R., Holmes. D., Weyers. J., Jones. A*. Practical Skills in Biomolecular Sciences* 3rd edition Pearson ISBN 0 13045142 8 **2007**

Johnson, S. & Scott, J. *Study & Communication Skills for the Biosciences.* Oxford University Press. ISBN 0 199219834. **2009**

9.2 OPTIONAL MATERIALS

The background reading list is deliberately long and lists books with similar titles. **You are not required to buy these books, nor are you expected to read them all.** You should consult these books when you want or need further help on a particular topic. If you find other books that help you, please let me know so that I can add them to the list.

- **Laboratory Work/Report Writing Support**

  Barnard, C., Gilbert, F. and McGregor, P., *Asking questions in biology: Design, analysis & presentation in practical work,* Longman Scientific & Technical (1993).

  Bradbury,S., *Introduction to the optical microscope (2nd edition),* Oxford University Press (1989).

  Shortland, M. and Gregory, J., *Communicating Science A Handbook,* Longman Scientific and Technical (1991).

- **Computing**

  Liengme, B.V (1997), A *Guide to Microsoft Excel for Scientists and Engineers*, Arnold

  An excellent on-line guide on using internet resources for study can be found at www.vts.rdn.ac.uk.

- **Study Skills Support**
  Van Emdem, J., (2001) *Effective Communication for Science and Technology*. Palgrave

  Acres, D., *How to Pass Exams Without Anxiety,* How To Books (1994).

  Bourner, T. and Race, P., *How to Win as a Part-time student: A Study Skills Guide,* Kogan Page (1990). Library number 387.170281.

  Britton A. and Cousins A. (1998) *Study Skills: A Guide for Lifelong Learners,* The Distance Learning Centre, South Bank University. Library number 387.170281.

  Buzan, T. (with Buzan, B.) *The Mind Map Book,* BBC Books (1993).

  Collinson, D., *Plain English,* Open University Press (1992).

  Leach, R., *How to Improve Your Memory,* National Extension College (1994).

  Race, P., *500 Tips for Students,* Blackwell Publishers for SCED (1992).

  Race, P., *Who Learns Wins,* Penguin Books (1995).

Internet resource: www.lisa.sbu.ac.uk

- **Quantitative Skills Support**

  Bird, J.O. and May, A.J.C., *Technician Mathematics 2 (3rd edition),* Longmans (1994).

  Ashcroft, S., Pereira, C.,(2003). *Practical Statistics for the Biological Sciences*. Palgrave. (This book is used in year 2 for Research methods Module)

- **Learning support classes**
  The Learning and Development Centre (Caxton House)
  http://www.lsbu.ac.uk/caxton/index.html

  The Learning and Development Centre run regular courses, workshops, etc. and can arrange one-to-one sessions to help students with all aspects of university life, ranging from study skills to financial and careers advice. These courses are free to LSBU students. Many of their handbooks can be downloaded from the web-site.

NOTES

A Blackboard site supports this module.

Standard Format for Laboratory Reports

There are certain rules you should follow in all forms of scientific writing:

- Write in the past tense
- Avoid the use of 'I' or 'We'. Write in the passive tense.
- Always reference your source material fully.
- Use SI units only
- Species names should be given in full, written in italics e.g. *Homo sapiens*
- Chemical names should be written in full, together with the chemical abbreviation, the first time they are used e.g. sulphuric acid (H_2SO_4)
- **DO NOT** copy directly from practical schedules. **ALL** work must be your own.

The standard format for a scientific report is as follows:

- Title
- Abstract
- Introduction
- Methods
- Results
- Discussion
- References
- Appendices (where appropriate)

Title
The title should be brief and informative, explaining clearly what the report is about.

Abstract
The abstract should be a short (no more than 200 words) summary of the essential information from the report. It should set out the background, aims methods results and conclusions. The results and conclusions are the most important part of the abstract.

Introduction
The introduction should describe the background and aims of the investigation. It should clearly answer the following questions:

- What has been done before
- What still needs to be investigated
- Why is the work important
- What are the aims of the investigation

Methods
The method section should describe:

- What was done
- How it was done
- What equipment was used
- What statistical tests were used

If you have been working from a detailed practical schedule, do not copy the method but describe any changes that you made. You do not need to list every item used but you should record the details of any analytical instrumentation used – make, model and operating parameters.

You **do not** need photographs/diagrams of standard items of laboratory equipment.

Results

The results section should describe and show what was found, together with the analysis of the findings. **DO NOT** interpret or explain the results in this section.

The text should clearly explain the key features of the results and describe what is being shown in each table or graph. Refer to your tables etc. by number. e.g. Table 3, Graph 2

- Every table, graph or diagram should be clearly numbered, in sequence, and have a clear descriptive heading.
- Each table (including title) should fit on one page.
- Each column in a table must have a clear heading, including units of measurement.
- All graphs should be drawn using MSExcel (or equivalent software) – ensure you use the correct graph type for your data!
- Graphs should be large enough for data to be clearly visible.
- Variables must be plotted on the correct axis.
- Axes must be clearly and correctly labelled and units shown.
- Data points must be shown on graph.
- Where a regression line is fitted, the equation and R^2 value should be shown.
- Data and results of calculations should be shown to the same number of decimal places as the original measurements.
- Results of statistical analysis should state the name of the test, the test statistic, number of measurements and the level of significance accepted.

Discussion

The discussion should interpret and explain the results of the experiment and relate your findings to other published work.

- Summarise your key results, relating them to the stated aims.
- Discuss each finding in turn, relating to other work where relevant and explaining any differences you may have found from published and/or expected results.
- Identify areas where you had problems and/or potential sources of error (**DO NOT** simply blame poor results on 'human error' or the experiment being 'too difficult').
- Identify areas for improvement in the experimental design (**DO NOT** claim that automated/computerised apparatus would give better results) and suggest how the investigation might be continued.
- Conclude with a paragraph that summarises the key findings and their interpretation.

References

You should include a complete list of ALL the references that you cited in your text, using the Harvard System of referencing.

References to web sites should include the **full** web address of the actual site used (not links from search engines) and the date and time the site was viewed.

Appendices

Your results section should contain the key data, but this may have been processed from a larger data set that is not included.

You may occasionally wish to include this raw data and/or additional information, such as print-outs from instrumentation, examples of calculations, etc. in your report for reference. This information should be placed in the appendices. Each type of information should be placed in its own numbered and clearly titled appendix.

Table 1: Measurements of lead, cadmium and biomass at increasing distances from the road.

Distance from Road (m)	Pb concentration (ppm)	Cd Concentration (ppb)	Biomass (g)
0	125		
10	118		
25	113		
50	97		
100	70		
250	7.5		

Figure 1: Scatter graph showing relationship between distance from road and lead concentration