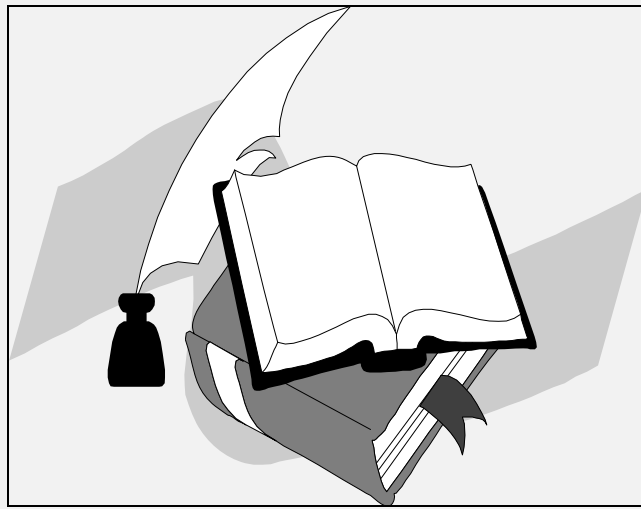


The How II Guide



Key Skills

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Key Skills

OR how to get the best marks in assessments and give employers what they want...

READ THIS !!!

When most of you hear the dreaded words 'Key Skills' you probably either assume you have them already, or, that they are a waste of time and so switch off. There are three very good reasons why you shouldn't!

First, experience has shown that when students (that's you) rate their own skills they tend to over-estimate their abilities compared to what staff (that's us) see in their assessments. In other words, you often think you can do something well but just as often can't!

Second, you cannot get a degree *without* being assessed and hence learning what staff expect to see when they mark your work will improve your marks immensely. Assessment falls into a number of distinct categories; (i) exams (ii) lab reports (iii) field reports (iv) essays (v) posters and (vi) giving talks. You'll be assessed on ALL of these things whilst you're here and each Chapter of this booklet gives you detailed guidance on how to get the best marks. So, when you get given an assessment **THE FIRST THING YOU SHOULD DO** is read the relevant Chapter in this booklet. That way you'll know what we're after!

Third, employers rate generic / transferable / key skills very highly. They often tell an employer MORE about what a potential employee is likely to be like than the knowledge they possess alone! You need both knowledge **AND** skills these days to compete in the market place. You should, therefore, get into the habit of **KEEPING A RECORD** of the general skills you acquire during your degree. You'll need this info not only in your second year for your CV, but thereafter too, when you're looking for jobs after graduation. **DO NOT** underestimate the value placed on these skills by employers!!!

Finally, some advice - upfront. Good exam performance relies on good revision and good revision relies on having a good set of notes. We all learn in different ways and there is no substitute for taking the notes **yourself**. The bits YOU understand during a lecture may be quite different from the bits your mate understands and his/her notes will reflect this! Take your own set of notes whenever humanly possible. The first Chapter of this booklet gives you some tips on what to expect in lectures and how best to get a decent set of notes on which your exams depend.

This booklet has not been written for fun. It's been written to HELP YOU get the best out of your degree. REFER TO IT OFTEN and DO NOT lose it!!!



CHAPTER 1

How to take a good set of notes: understanding lectures

Some of you, no doubt, are familiar with attending lectures and taking notes. For others this is probably a new experience. This document explains what lectures are all about. It describes the purpose and scope of university lectures and sets out guidelines that will help you to gain maximum benefit from attending the lectures on your chosen programme of study. It also provides useful tips on how to record lectures in the form of your own personalised notes.

The ability to make good comprehensive notes is an important Key Skill that is the foundation for successful exam performance. During Semester 1 (Level 1) you will have the opportunity, within the Study Skills module and associated tutorial programme, to develop your note-taking skills. As part of this programme your personal tutor will examine selected notes, evaluate your effectiveness at note-taking and make suggestions for improvement.

The purpose of lectures

Lectures serve several purposes. The main ones are to:

- Stimulate interest in the subject matter.
- Convey important information in a structured and ordered manner.
- Develop ideas, concepts and principles.
- Supply selected examples and images that support the main themes.
- Develop a critical awareness of the limitations of information.
- Provide a supportive environment in which you can ask questions and seek clarification.

A good lecture is not an opportunity to doze and mindlessly transfer undigested words on to your notepad in the hope that you might read them later. A lecture should be a relaxed interactive experience in which the lecturer develops a rapport with his/her audience. A lively interchange of ideas makes for good lectures and good education.

Lectures are not intended to provide a comprehensive account of each subject area. Given the vast amount of information available, this is an impossibility. Lectures provide the broad framework around which you can begin to wrap your ideas. Learning, therefore, does not stop at the end of the lecture. You are expected to read around and thereby 'flesh-out' your lecture notes. The module reading list is the starting point to do this but you may also be given details of additional relevant reading matter by your lecturer (particularly at levels 2 and 3).

Note taking

Lecture notes are the vital store for all the information you acquire during lectures. These notes allow you to revise effectively for exams. You really do need, therefore, to compile a well-organised set of notes that provide comprehensive cover of the module subject matter. Notes tend to be individualistic and each person has his or her own favourite way of note-taking. Furthermore, lecturers differ in both their approach and style of delivery and you must adopt a note-taking method that can cope with this variation. This can range from 'talk and chalk', through the extensive use of overheads to more sophisticated integrated presentations involving computer packages such as Microsoft *POWERPOINT*. Nevertheless, there are some general guidelines to follow:

- Take abbreviated notes: do not use long-hand.
- Learn to separate the significant from the insignificant and write down only the former.
- Divide your notes into relevant sections with appropriate clear headings.
- Use a clear hierarchy of headings (can afterwards be emphasised by, say, different coloured underlining) to indicate the importance of sections.
- Make extensive use of bullet points to summarise information.
- Adopt a clear layout with plenty of space so that the notes are easy to read and there is space to add points if necessary.
- Ensure that the main points are supported by examples (when given).
- Do not assume that illustrative 35mm slide sequences are an opportunity to sleep - make notes about what they show.
- Learn to draw all figures quickly using freehand: **do not** expect to have time to copy everything down neatly. **Do not** use a ruler for straight lines.
- **Do not** copy detailed overheads down in exact replica - you will find that you may not have time to do this.
- Ensure at the start of a lecture that you write down the aim of the lecture and, if possible, an outline of the content.
- At the end ensure that you capture the important summarising points and conclusions.
- Make a note of relevant further reading.
- After the lecture, re-read your notes to make sure they make sense. Label them correctly and keep them in a well organised hardback file. You can supplement the notes with extra reading at a later date.
- For each module, produce a sketch map that summarises the links between the main topics covered.
- Discuss your notes with your fellow students.

Lecture series

Each module has an outline *syllabus* that defines the scope of the lectures. Associated with each syllabus is a set of *learning outcomes* that define the things you should know and be able to do when you have completed the module or programme.

It is important to recognise that in a well-designed course the lectures develop a series of topics and ideas that are often strongly interlinked or form the foundation on which ideas are later developed. These reinforcing links provide the cement that holds the syllabus together. Similarly, within each lecture there is an equivalent structure (see later) by which the various parts of the lecture are linked together.

Attendance and time-keeping

Given the above, it is obvious that attendance at all lectures (and practicals) is vital if you are to gain a full appreciation of the module content. If you miss lectures you miss the vital links and will not be able to understand the context within which ideas are developed. Similarly, if you manage to sneak unnoticed into the back of a lecture 5 minutes after it has started you are likely to have missed the main introductory phase that explains what the lecture is about and also outlines its content.

To gain the full appreciation of your chosen subject it is necessary to attend all lectures on time and not to pick and choose. If your lecture notes are inadequate it is likely that your exam performance will be inadequate. Photocopying the notes of others is not sensible as you will be copying their mistakes and shortcomings at note-taking.

Lecture presentation and content

Irrespective of subject matter content, a lecture should be broken up into recognisable sections that serve particular purposes. It is your job, with the help of verbal signals from the lecturer, to recognise these sections.

The lecture usually begins with an introduction that relates it back to previous lectures, introduces the main topic and places this topic in its broader context. The introduction will often provide an outline of what is to follow.

The main lecture itself will usually cover a series of linked topics, each of which are discussed in some depth and often accompanied by the use of selected examples. Examples may be supported by data tables, graphs or pictorial colour slides. These examples form a vital part of the lecture and are not an opportunity to switch off and have a chat with your next-door neighbour.

A good lecturer will continually emphasise and highlight the important points and will often repeat the same information in different ways to reinforce particular details. The lecture will often conclude with a brief summary of the main points and conclusions, leaving some time for questions and points of clarification.

Lecture material becomes progressively more demanding as you proceed through your programme. At Level 1 you will receive a lot of basic information across a wide spread of subject areas. As you move into Level 2 and begin to specialise the information content of lectures will become more specialised, with a greater emphasis on more difficult concepts and ideas that perhaps take a little longer to digest. By the final year, the emphasis will be on more controversial or 'leading edge' areas of work where there is perhaps less certainty and where there is greater opportunity to debate ideas.

Participation in lectures

Contrary to popular belief, lecturers enjoy responding to your questions - it indicates that you are interested, alert and inquisitive. Lecturers also despair when they are unable to provoke a response from a group of moribund students! Exchange of views produces lively lectures.

Staff expectation of students

Academic staff have high expectations of student behaviour on their modules and this involves:

- Regular attendance.
- Early arrival for lectures - no late entrances.
- Active participation in the lecture/practical classes.
- No chattering or other distracting activities during lectures.
- No eating or drinking in the lecture theatre.

Student expectations of staff

Similarly, students should expect to receive a good standard of lecture. Staff are continually involved in a series of teaching appraisal schemes involving both other staff and student classes to try and continually improve their performance. Nevertheless, as with any group of people, some staff are more effective lecturers than others.

What do you do if there is a real problem, such as not being able to hear the lecturer or all the slides being too small to read? Do not sit there and grumble: bring it to our attention. Your first approach should be to the lecturer involved. He or she might be able to rectify the problem on the spot. If that fails you can discuss the problem with the School Teaching and Learning Co-ordinator, with the Director of School or with the Deputy Director of School.

Teaching questionnaires

Student opinion is highly valued and you will be given the opportunity, through a series of questionnaires, to give your opinion on the teaching standards on each of your modules and on the teaching effectiveness of the staff involved. The results from these surveys is reviewed both by the School and the University and is fed into a quality improvement process. Where action is required this is defined and acted upon.

KEY SKILLS



CHAPTER 2

How to write good lab and field reports

Why are report writing skills important?

During your time at Liverpool John Moores University you will be required routinely to produce reports on practical work that you have carried out. These may vary from short laboratory reports, produced during practical classes, to longer reports on laboratory experimental work and fieldwork. The assessments for many modules have a high coursework mark, where good performance in writing-up practical work can make a major contribution to your overall module mark. It is, therefore, in your best interest to read this document **very carefully** and to follow closely the guidelines suggested in every report you write.

These standard guidelines of good practice have been agreed amongst staff members and failure to follow them will inevitably result in you achieving marks below your potential. The message, therefore, is simple - learn the guidelines and get into the habit of following them. Skilled report writing is an essential element of your education and will be of immense benefit to you in your future career

This document first presents a set of rules and guidelines for the presentation of reports. These are complemented by examples of reports on the same experiment, one 'good' reports conforming to the guidelines and one 'bad' report illustrating all the mistakes that should be avoided. A short check-list of the major points, against which you must check every report you write, is included.

FAQs

Why do we have to write reports?

The report provides a written demonstration that you have carried out a piece of practical work using appropriate methods and that you are able to gather together the results, analyse and interpret them in an appropriate manner and place the findings in a broader context.

At whom should I aim the report?

You should write reports that can easily be followed and understood by any intelligent reader. Do not assume that it is only for the eyes of the lecturer who set the work.

What characterises a good report?

A good report is one that can be picked up and easily read, following a clear and logical sequence from beginning to end. A bad report is one that is difficult to follow and lacks a clear structure.

How important is presentation?

Presentation **is** important. You should aim to make your report look attractive and tidy. If you are word-processing use a typeface that is large enough and easy to read. Avoid blocks of text in capital letters as these are difficult to read. **Spell-check all text:** there is no excuse for spelling mistakes. Ensure that the scientific names of all genera and species are either in *italics* or underlined. If the report is hand-written then make sure it is legible.

Figures and tables (see later) should be well-designed and placed in an appropriate position. Number the pages consecutively. Submit the work in a folder or binder. Always re-read and re-check your work before submitting. Ensure that you present things in a consistent manner.

How long should the report be?

This depends on the nature of the work. There is no virtue in producing long complicated reports: remember your lecturers have to read them! What we are looking for is **quality** not quantity. A good short report will receive many more marks than a long tedious and repetitive report. Part of the skill of report writing is deciding what is important and should be included and what is unimportant and should be excluded. Once you have decided what to include try to write as **concisely** as possible.

Should I use long words, sentences and paragraphs?

No, nay, never! Good scientific writing is simple and easy to understand. Do not use complicated scientific words when there is a good simple alternative English word. Keep jargon to a minimum and only use it when it is beneficial, such as when there is no suitable alternative or where an appropriate scientific word can replace a longer English phrase. Try to write **precisely** and avoid ambiguous phrases. It is important that scientific writing conveys the exact meaning you intend. Steer clear of clichés and long meaningless phrases (waffle).

Avoid long and complicated sentences. Simple short sentences are easier to read, which makes the meaning easier to grasp. Divide your work up into paragraphs of linked sentences and make sure that you use adequate punctuation. Remember that a sentence begins with a capital letter and ends with a full stop and contains a subject, a verb and usually an object! Paragraphs should contain a minimum of 3 sentences.

How important is writing style?

You should aim to make your writing varied and interesting rather than dull and repetitive. This is something that you really need to work at and develop. If you find that you keep using the same word over and over and over again look for an alternative using the thesaurus (a list of alternative words) on the word processor or alternatively buy yourself a small pocket thesaurus. You will soon learn how to avoid repetition and your writing style will improve.

Scientific reports are written in the **past tense** and usually in the impersonal third person singular e.g. a test-tube was taken..... . Some scientific journals now encourage the use of the more personal first person singular e.g. I took a test-tube..... . The first style is preferred.

It is important to blend references to published work into the text. There are two ways to do this, which we can illustrate by an example. Imagine that two scientists Smith and Brown in 1996 published the results of an experiment in which they compared the hopping speed of three-legged kangaroos with that of able-bodied kangaroos and discovered that the three-legged kangaroos hopped only 0.73 times as fast as their four-legged counterparts. We could summarize this as follows:

Smith and Brown (1996) showed that three-legged kangaroos hopped 0.73 times as fast as four-legged kangaroos.

[uses authors name as part of sentence].

or alternatively

Three-legged kangaroos hopped 0.73 times as fast as four-legged kangaroos (Smith & Brown 1996).

[uses reference to support a statement]

Where there are more than two authors it is usual to quote the name of the first author followed by *et al.* (short for *et alia* which means 'and others'). e.g. Smith *et al.*(1996).

What is meant by ‘Scientific integrity’ and why is it so important?

Science ultimately depends on honesty and trust and this should be reflected in your report. Fabricating results is a capital offence!

It is important that you write up the results that **you** collected even if they are not quite what you expected. It gives you a good opportunity to demonstrate to the lecturer your skills at interpreting data and suggesting why you got the results you did! Unexpected results are not penalized provided they can be explained. After all, many scientific discoveries result from experiments that 'went wrong'.

Always acknowledge your source of information, particularly where this is derived from maps, tables and graphs or is not seen in the original. Do not quote papers you have not seen, even if they are referred to in a book. Quote the book instead: the book author may have misinterpreted the original!

Can I ask a lecturer for help and advice?

Yes. Do take advice from your lecturer about specific reports and if you are in any doubt about what is required then ask for help and/or clarification. It's a right pain to lose marks simply because you were not 100% clear about what the lecturer was after.

Specific guidelines

Good organization, involving a logical and well thought out sequence of ideas, is essential to the report. This can be achieved by breaking the report down into a series of sectional headings under which this logical sequence is developed. The sectional headings are:-

- **Title**
- **Introduction**
- **Study Site (where appropriate in field reports)**
- **Materials and Methods**
- **Results**
- **Discussion**
- **Conclusions (where appropriate in long reports)**
- **References or Bibliography**
- **Appendix (where appropriate for raw data etc.)**

Much thought is required before you start writing to decide which piece of information belongs in which section. You need to place yourself in the position of the person who is reading your report. You should ask yourself the questions 'How can I make this report as easy to understand as possible? How can I simplify and present the information so that the reader can easily follow what I have done, the results that I have obtained and the conclusions that I have drawn? How can I explain the reasons for conducting the work and where do the results fit into the broader scheme of things?'

The content of each report section is considered in detail below:-

Title

The title should be informative but not too long. It should give a clear and concise indication of the precise nature of the work. It should **not** have an uninformative title such as 'Write up of Dr. Jones's practical' or 'Report on physiology practical'. An example of an informative title would be something like 'Experimental effects of bananas on the mating frequency of fruitflies (*Drosophila melanogaster*) in Ireland'

Introduction

The introduction serves three functions, it allows you to:

- Provide sufficient introductory background information to allow the reader to understand the nature of the work and what is already known. Here you may need to quote relevant references to other published works such as books or journal articles.
- State the rationale for the work. In other words to identify the broad scientific reasons why you conducted the work. What was it trying to show and where does it fit into the general scheme of things?
- Focus on the experiment/work in hand and make a clear statement of the detailed aims and objectives of the specific piece of work that **you** conducted. Here you state precisely the detailed ideas or hypotheses you are testing. What did you set out to do? It is a good idea to include the phrase 'The aims and objectives of the work/experiment were to ...' and/or 'The following hypothesis was tested.....'

Do not produce a long rambling introduction. Keep it relevant and concise.

Study Site

This section is appropriate when work is conducted in the field. You need to state exactly where the work was carried out. In the UK the Ordnance Survey Grid Reference to the exact spot (2 letter sheet reference and 6 or 8 digit number) is unambiguous whereas for field courses abroad you may wish to use co-ordinates of latitude and longitude). Much depends on the nature of your study as to what to include. There is often a tendency to include too much information under this heading simply because it may be available, rather than because it is strictly relevant.

Make sure that what you include is directly relevant to the task in hand. It might include a topographical map, a vegetation map or relevant background climatic data. Scale and direction (North-N) should be indicated on all maps. You may wish to refer to some other key study that been conducted at the site.

Materials and Methods

This is the section in which you describe exactly what you have done. Sometimes the methods are described in detail in a practical schedule and there is no point in copying these out again: time can be better spent analyzing the results! The simple statement 'see practical schedule' will often suffice, together with a listing, where appropriate, of any minor differences from the schedule. In this context, **take the advice of your lecturer**, but do not forget to include a copy of the relevant part of the schedule, if it is mentioned.

Where there is a need to produce a methods section again try to visualize the person reading your report. The reader needs to be able to follow exactly, and in the correct sequence, the procedures that you have followed. In other words you must give sufficient detailed information on the methods for the reader to be able to repeat reliably your experiment/work. **You should not give a long list of equipment used:** details of important equipment should be worked into the written text. You may also wish to include figures of essential pieces of large apparatus.

Included within the methods section should be details of the experimental methodology, a clear statement, where appropriate, of the statistical design of the experiment (e.g. randomized block, factorial etc) and a declaration of any statistical methods of analysis used (e.g. One-way Analysis of Variance (ANOVA), Chi-squared or Linear Regression). Do not forget to include an indication of the number of observations made or the number of samples taken (n).

You may also wish to state the statistical null hypothesis you are testing. You should at least state how you have applied the statistical test to the data and what are the important summary statistics that you will obtain (e.g. t or F values and their probabilities). State also the name of any statistical package you have used to analyze the data or to draw figures (e.g. MINITAB, EXCEL).

Results

This is the section in which you present the results. Again it is up to you to show your results in the best light possible. This often demands a lot of thought. Sift through your data and try to decide what you think are the really important findings that you want your reader to assimilate. Do not present everything: it is your job to extract the really essential detail from the pile of data available. This often involves providing summaries of the raw data (e.g. means and their error terms) in the form of tables and figures.

There is no place for great wedges of undigested data. If you want to include it, relegate it to an Appendix at the back: do not let it detract from the essentials. Similarly, there is no virtue in including a lot of repetitive calculations in detail, particularly the workings of every statistical analysis. A single example of each will do, any more becomes repetitive and tedious, so omit and present just the calculated result. Often a lot of complex data can be condensed into just a few simple tables or figures which highlight strongly the main points.

Another important guiding principle is that you do **not** present a few graphs or tables and then leave your reader to make up his/her own mind about their content. It is **your** job to provide a **written** results section that leads your reader through the various tables and figures, pointing out the essential details and presenting the results of the statistical tests that confirm the observed trends. Here it is important that the relevant tables and figures are placed close to the text and not stuck in some odd place such as an Appendix, or grouped together in a block away from the main text. This makes them difficult to refer to and the text becomes difficult to follow.

All figures and tables **must** be carefully cross-referenced to the text using a consecutive numbering system. Do **not** present the same data in both tables and figures or in different types of figure. Choose the most appropriate form of presentation and stick to it.

Remember that the results section is for the presentation of results. Do not make the mistake of discussing the results in this section. Full discussion of what the results signify and how they relate to other published work must be left for the 'Discussion' section.

Tables and Figures

All numerical data presented in tabular form are referred to as **Tables**. All graphs, plates, photographs and diagrams are referred to as **Figures**. All tables and figures should be numbered in sequence for cross-referencing with the text and should have a **self explanatory** title or legend. The title should explain the content of the figure or table without the need to refer back to the text. Often you can incorporate essential information into the legend, such as what the symbols signify on graphs.

Tables

You can often put several pieces of information together in a well-designed table. Do not try and present too much information in a single table - think of the reader. It is often better to split a large table into two smaller ones that are easy to read. Ensure that all columns have headings and that units of measurement are given.

Where you present mean data, use a sensible number of significant figures. For example, if you are measuring lengths to the nearest tenth of a metre, it is wrong to express the mean length with a greater level of accuracy. The mean of 13.1, 23.2 and 19.0m is 18.4m not 18.433333m. You can often incorporate statistics such as t and F values into tables, together with probability values (P).

Figures

The most widely used type of figure is the graph, which provides a visual summary of trends within the data. Again graphs should be kept as simple as possible. Avoid the temptation to (mis)use clever computer graph plotting packages to draw graphs that are far more complex than they need be. For example in EXCEL we often see simple 2-dimensional bar charts drawn as pseudo-3-dimensional graphs. This is both overly complex and wrong. Stick with the simple. Do, however, include statistical error bars whenever possible.

Make sure that each graph axis is correctly labelled and units given. Use data points that are clearly identifiable and join up data points using **straight** lines unless you suspect otherwise. You may, however, need to fit a trend line to data and here it is permissible to draw the line of best fit to the data points. Do not then fit a straight line to data points that lie on an obvious curve. Know when to use a line graph and when to use a bar chart or histogram.

Often you can plot several lines on the same graph (maximum 3 or 4) and this makes comparison between trends easier than looking at several separate graphs. Similarly, you can put different graphs alongside or underneath each other to permit comparison. However, avoid the temptation of putting too many overlapping lines on a single graph or too many graphs on a page. Ease of understanding is of supreme importance. Grouping graphs can help this but if the graphs become too cluttered overall clarity begins to decline.

Diagrams

Sometimes you may be required to make diagrams or sketches of biological specimens or pieces of apparatus. Always make drawings on unruled paper. Ensure that each diagram indicates the scale or magnification and indicates the angle from which you are drawing the

object, from the side (lateral view), from above (dorsal view) or from below (ventral view).

Statistical presentation

Whenever you have conducted statistical tests you should give the relevant statistical information within the results section to support your conclusions. This should **not include** pages of undigested computer output. It **should include** the important summarizing statistics. Such information can be included in tables or can be incorporated into the written text. For example, if you were comparing the organic matter content of two soils A and B using a Student's 't' test (with 40 degrees of freedom) and A had a significantly higher mean value than B you might write: 'The organic matter content of soil A (mean=9.7%) was significantly higher than that of soil B (mean=4.6%)($t=11.3$, $P<0.001$, $d.f.=40$).' Alternatively, the statistical data could be presented as ($t_{40} = 11.3$, $P<0.001$).

Units

You **must** write all scientific reports using the International System units (S.I. units). Put simply, these are standardized metric units that are recognized internationally. The common unit, with their standard abbreviations are:

| | | |
|--------------------|--|------------------------------------|
| <i>length</i> | metre (m) | |
| <i>volume</i> | decimetre cubed (dm^3) | (although litre (l) commonly used) |
| <i>area</i> | hectare (ha) | |
| <i>mass</i> | kilogram (kg) | |
| <i>time</i> | second (s) | |
| <i>temperature</i> | degrees Kelvin ($^{\circ}\text{K}$) (although everyone uses degrees Celsius ($^{\circ}\text{C}$) which is effectively the same scale). | |

Units should be abbreviated and written as follows:

metres per second m s^{-1} **not** m/s or m/sec
 kilograms per hectare kg ha^{-1} **not** kg/ha or kg/hect

s^{-1} and ha^{-1} are the correct way of writing 'per second' and 'per hectare' respectively. The superscript (-1) is the correct mathematical notation for writing 'per' (i.e. 1/s or 1/ha).

Discussion

This section demands a lot of thought and it is the part of the report that your lecturers will look at most closely when deciding what mark to give you. This is the section where you can display to good effect your incisive intellect! Good discussions produce good marks.

The Discussion serves several important purposes. First, it allows you to look individually at each result or piece of information you have collected and to evaluate and interpret its significance. Second, when you have presented several individual results, it permits you to draw these results together into a coherent story and to explain how they link together. Third, it enables you to put your results into a broader context by reference to the relevant literature.

When writing a 'Discussion' section it is helpful to refer back to your experimental rationale and your aims and objectives. It is against these that you must judge your results. Have you achieved your original objectives? Are the results what you might expect? If not then why not? Can you explain any unexpected results? Can you identify weaknesses in the work? Can you suggest modifications to the methodology that might improve the quality of the data collected? Science is an unforgiving activity and hard critical evaluation of your own work is to be encouraged.

Avoid statements of the obvious such as '... more samples would have increased the accuracy,' or statements about avoidable errors such as '... better results would have been obtained if the thermometer had been read correctly'.

The 'Discussion' is the part of the work where you have the opportunity to express your own ideas. Do not be afraid to do so. If you think you can see novel ideas or links within the data, or if you can relate your work in an original way to the existing literature, write these thoughts down. Degree level studies are about thought and interpretation and the encouragement of lateral thinking. You will not be penalized for expressing your own ideas, however weak or wild, provided they are logical and supported by evidence. Your lecturers would rather see a genuine, if not wholly successful, attempt to produce ideas than see no attempt at all.

Conclusions

Short reports generally do not require a 'Conclusions' section as the main conclusions are contained in the 'Discussion'. However, if you produce a long report it may be helpful to the reader, right at the end, to include a short 'Conclusions' section that re-emphasizes, but is not a repetition of the main findings. This, however, is not a substitute for the 'Discussion'

References

A good practical report will be supported by references in the text to relevant literature. The purpose of the 'References' section is to provide the reader with the necessary information to go into a library to find and refer to that published work. References should always be listed **by first author in alphabetic order**. More than one publication by an author should be ordered by date sequence, with more than one publication in a year being designated by a,b,c, etc.

There are three main types of reference: a **book**, a **journal** article and a **chapter** within an edited book. There is some variation in the way these are cited in the literature but we strongly recommend that you always follow exactly the format listed below. Note that certain parts of each reference are in *italic type* to make them stand out. If your report is handwritten use underlining instead.

Book

Author(s). Date. *Title of Book*. Publisher, Place of Publication.

e.g.

Crompton, E. 1966. *The soils of the Preston district of Lancashire*. Agricultural Research Council, Harpenden.

Journal Article

Author(s). Date. Title of article. *Title of journal* Volume number of journal. First and last page numbers.

e.g.

Wilson, E.J., Wells, T.C.E. & Sparks, T.H. 1995. Are calcareous grasslands in the UK under threat from nitrogen deposition? - An experimental determination of a critical load. *Journal of Ecology* 83, 823-832.

Chapter in an edited book

Author(s) of the chapter. Date. Title of chapter. pp.(first and last page numbers). In (Name of editor(s)(ed.)) *Title of the edited book*, Publisher, Place of Publication.

e.g.

Tooley, M.J. 1994. Sea-level response to climate. pp.172-189. In (Roberts, N. (ed.)) *The changing global environment*. Blackwell, Oxford.

Avoid citing everything you have used while researching the work. Only include those published references that are strictly relevant. Do not cite your lecture notes.

Appendix

The Appendix is the place where you put results or information that are too detailed to include in the text and where their inclusion would detract from the clear and logical presentation that you are following. It could include tables of raw data or more extensive computer analyses of results. These are sets of information that are not necessary for an understanding of the work but might be referred to by the reader if they wanted to reanalyse your data or question some point of analysis. They will be summarized in digested form in the main body of your report.

Never put your main results, such as tables or figures, in the Appendix. Always ask yourself whether an Appendix is necessary.

List of things to check before you hand in your report

- Have I put my name on it?
- Is the report, where appropriate, divided into the following sections?

Title

Introduction

(Study Site)

Materials and methods

Results

Discussion

(Conclusions)

References

(Appendix)

- Are the pages numbered and in the correct sequence?
- Has the report been re-read and checked for spelling?
- Is the title explicit?
- Does the introduction state the rationale, aims and objectives of the work?
- Does the methods section give sufficient detail, particularly of the statistical method of analysis used?
- Do all tables and figures have an explanatory title or legend? Are they numbered in sequence and placed in an appropriate part of the text? Are all columns and axes correctly labelled and with units?
- Does the results section contain a detailed written account of the main points shown in the tables and figures? Is it cross referenced to the tables and figures?
- Does the discussion relate the results to the original aims and objectives?
- Are the conclusions supported, where appropriate, by the statistical analysis?
- Is the list of references complete? Are they correctly cited and cross-checked against the text?
- Are all the genus and species names in *italics* or underlined?
- Am I satisfied with the report? Is it as concise and precise as I should like it to be? Are there any lessons I can learn for next time?

KEY SKILLS



CHAPTER 3

How to write good essays

Introduction

One of the most important skills that you can develop during your degree course is the ability to communicate effectively using the written word. Scientists are frequently required to write about their work in many ways, for example in the form of an evaluative essay, a review of the relevant literature, an explanatory article for a scientific magazine or a synopsis of ideas.

These forms of writing contrast with a formal laboratory or field report in that they require a critical evaluation of what has been read, using a concise narrative style. Scientific writing may seem daunting, but it need not be if you follow the basic steps presented below.

Writing skills

Scientific writing helps you to develop several valuable skills including:

- **Self teaching through reading and compiling information**
- **Critical awareness of sources of information**
- **The ability to organise and present information logically**
- **The competence to demonstrate that you understand a topic**
- **The facility to weigh evidence and draw conclusions**

Good scientific writing shows evidence of ability in all of these skills, whilst badly written work is poorly organised, shows lack of understanding and repeats published work without considering its strengths and weaknesses.

Where do I start?

To achieve success, your scientific writing should go through five stages:

- 1. CHOICE OF TOPIC**
- 2. RESEARCH**
- 3. PLANNING**
- 4. WRITING**
- 5. REVISION AND EDITING**

If any stage is omitted, or the wrong order followed, then you are heading for problems. Note that writing comes late in the process - there is much to do before putting pen to paper or finger to keyboard.

Each of these headings is considered in more detail below.

Choice of topic

Sometimes the topic is chosen by the lecturer setting the work, although often you will be presented with a choice of title from which you must select one.

Ensure that you understand exactly what is required from the start to avoid wasting time researching irrelevant material. If you are presented with a one-phrase title like 'Photosynthesis', 'Ecological Succession' or 'The Evolution of the Primates', you should develop your own focus to avoid getting bogged down in excess information.

Alternatively, the question may be more specific, for example, 'Critically evaluate the biological evidence for global warming'. To answer this question you must gather and evaluate evidence from the literature, looking for patterns or inconsistencies between scientific findings in order to draw your own conclusion. Note that the question asks you to consider the biological evidence - discussion of chemical or physical changes, are not relevant unless they are directly related to biological processes.

For further information on understanding what is required from essay-type questions, see the related document entitled *Passing Exams*.

Research

Before you start writing, you need to research your topic. The information required can come from many sources, including lecture material, textbooks, scientific journals, the scientific and environmental press (e.g. *New Scientist*, *National Geographic*, *Scientific American*), Newspapers (sensible ones please, not the *Sunday Sport!*), educational television, video programmes and the Internet. The wealth of information may appear daunting and you must avoid starting enthusiastically and then becoming disillusioned by an apparently unending list of suitable references. This may be avoided by following a few simple rules.

Reading should take place in the following three stages:

1. GAIN A BROAD OVERVIEW.

Read your lecture notes and the relevant parts of one or two recent textbooks to gain an overview of the topic. Make brief notes in the form of key points and headings.

2. LOCATE AND EXAMINE MORE DETAILED INFORMATION

You may be given a reference list of papers and articles to provide a starting point or you may be recommended literature in lectures. Use these sources to get started. Do not consider them to be the only references you should consult. Later in your degree programme you will be taught literature searching techniques including the use of computer-based data files such as BIDS (*Bath Information Data Services*), CD-ROM or *Biological Abstracts*.

Once you have collected your reference sources, read the associated abstracts or summaries or look at tables and figures to determine whether the information is relevant. Do not read every source in detail until you have identified what is most relevant.

3. OBTAIN THE FINE DETAIL

Concentrate on the most highly relevant sources and read these carefully, taking notes where appropriate. Do not be afraid to reject sources that you consulted at stage 2 but which have turned out to have limited relevance.

Planning

You now have available a chosen title and a collection of notes from several reference sources. How should you organise and condense these into a coherent piece of writing? You will have difficulty unless you plan your work carefully.

A plan has several uses:

It ensures that you:

- **identify, clarify and arrange the main points in the most suitable order**
- **avoid repetition**
- **do not omit important material**
- **give a sense of purpose to the writing**

You need to organise your notes into a coherent order. First read them to get an overview and then sort them into categories - you can use coloured pens to highlight notes that will be

useful in different sections. Again do not be afraid to eliminate notes that are irrelevant or repeat information. Successful scientific writing depends as much on what you exclude as on what you include.

Your writing should contain:

- **an introduction**
- **a main body of information**
- **a conclusion.**

Beyond this essential pattern, the way you order the information could follow a number of possible routes:

Chronological

Discusses events in the order in which they happened. This might be used to describe the evolution of a particular group of organisms or in a discussion of geological history.

Comparative or thematic

Compares and contrasts evidence. Avoid presenting one side of the evidence (similarities) then the other (differences). It is better to consider each topic point-by-point, comparing and contrasting as you go.

For and against

An approach often used when discussing evidence surrounding a scientific theory. Keep the writing balanced by presenting the evidence for and against in approximately equal measure. Draw your own conclusions based on the evidence presented.

From the simple to the complex

An effective approach when describing detailed biological processes as it requires and promotes good understanding.

The actual writing of it...

Introduction

The introductory first paragraph is crucial in putting the reader in the right frame of mind to understand and appreciate your work. It should introduce the nature of the topic, say what will be covered and define any technical terminology that may appear in the title or within the body of the writing.

It is a good idea to refer to the important words used in the title within the introduction.

Main body

This should consist of a number of paragraphs, each tackling a relevant issue. Paragraphs are not arbitrary: each should deal with a particular point or theme and each should lead logically to the next. If you have planned your writing effectively, this should follow automatically from the plan.

Do not summarise papers or experiments one-by-one: compare and contrast different work on the same theme, thereby developing a picture.

Use scientific findings and examples to illustrate your points. Do not attach these to the end of a paragraph as an afterthought but give sufficient detail to explain how and why they support the point that you are making.

Conclusion

The final paragraph(s) should re-emphasise briefly the main points and conclusions that you wish the reader to retain. Do not introduce new information in your conclusion and avoid expressing views that are at odds with the rest of the essay.

Use of references

You should always acknowledge your sources of information by citing literature. It is rarely appropriate to quote directly from authors. An exception might be where you give someone's precise definition, in which case "quotation marks" should be used and the author and date given. Otherwise, do not copy text verbatim from papers or books. Put the information into your own words and acknowledge its source by citing the reference.

For each reference give the author's(s') surname(s) followed by the year of publication (e.g. Smith 1995; Jones and Bloggs 1996).

Where there are more than two authors, it is acceptable to use *et al.* after the first author's name (e.g. Smith, Jones and Bloggs 1997 should be cited as Smith *et al.* 1997). The phrase *et*

al. is short for the Latin *et alia*, meaning 'and others' and it is usually italicised (or underlined in hand-written work).

Each reference must be cited in full in a list at the end of the essay. References should be listed as described in the Key Skills document entitled *Writing Reports on Practical Classes and Fieldwork*. They are re-emphasised below:

References should be listed by first author in alphabetical order. More than one publication by an author should be ordered by date sequence, with more than one publication in a year being designated by a,b,c, etc.

There are three main types of reference: a book, a journal article and a chapter within an edited book. There is some variation in the way in which these are cited in the literature but we strongly recommend that you always follow exactly the format listed below. Note that certain parts of each reference are in italic type to make them stand out. If your report is hand-written, use underlining instead.

Book

Author(s). Date. *Title of Book*. Publisher, Place of publication.

e.g.

Crompton, E. 1966. *The soils of the Preston district of Lancashire*. Agricultural Research Council, Harpenden.

Journal Article

Author(s). Date. Title of article. *Title of Journal*, Volume number of Journal. First and last page numbers.

e.g.

Wilson, E.J., Wells, T.C.E. & Sparks, T.H. 1995. Are calcareous grasslands in the UK under threat from nitrogen deposition? - An experimental determination of a critical load. *Journal of Ecology* 83, 823-832.

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Author(s) of the chapter. Date. Title of chapter. pp. (first and last page numbers). In (Name of editors(s)(ed.)) *Title of edited book*. Publisher, Place of publication.

e.g.

Tooley, M.J. 1994. Sea-level response to climate. pp 172-189. In (Roberts, N. (ed.)) *The changing global environment*. Blackwell, Oxford.

Avoid citing every reference you have consulted while researching the work. Only include those published references that are strictly relevant. Do not cite your lecture notes.

Graphs, tables and diagrams

A graph, table or diagram can often explain or illustrate a point better than text. All graphs and diagrams should be labelled as Figure 1, Figure 2, etc. and have a self-explanatory title. Likewise, tables should be labelled Table 1, Table 2 etc. and have a similar title.

Tables and figures should always be referred to in the text to indicate where they fit. Unlike practical reports, where tables and figures are derived from collected data, tables and figures are obtained from the literature and the source must be acknowledged using the appropriate reference. Deliberate failure to acknowledge sources amounts to plagiarism, a capital offence!.

Do not repeat the information in figures or tables again in the text: use the text to explain what the tables and figures illustrate or demonstrate.

Use of scientific names

Species of plant and animal referred to in English should be given their correct scientific name the first time they are mentioned. Scientific names should be *italicised* or underlined so that they appear prominent. The first part of the name (the genus) should begin with a capital letter. The second part (the specific name) starts with a small letter.

Where only the genus is known, give the name followed by sp. (if referring to one species) or spp. (if referring to the genus in general).

EXAMPLES:

The House Sparrow *Passer domesticus*

A sparrow species *Passer* sp.

Sparrows in general *Passer* spp.

Revision and Editing

Having written your masterpiece it is tempting to put your feet up, relax and congratulate yourself. Hold on, you have not finished yet! What you have is a first draft. In your haste to write down your ideas you will almost certainly have made several mistakes that need correcting, as they could cost you valuable marks. Furthermore, the act of writing may stimulate new ideas and you may wish to modify what you have written.

You must now read through your work several times and check the following:

SPELLING

If you have used a word processor, **always** use the spell check but beware of incorrect use of similar words, such as were or where and there or their, which the spell-checker will not detect. If your work is hand-written keep a dictionary to hand.

GRAMMAR

You can also check this on a word processor but look out particularly for inappropriate punctuation. Ensure that sentences are complete.

FORMAT

Ensure that you have clearly separated your paragraphs with a line space between each and an indented first line. In general, a written assignment should flow, only using numbered or bullet points where they are appropriate.

CONTENT

Edit your work to remove ambiguity, irrelevant material, contradictions and excessive words. This is straightforward on a word processor but you will need to produce a final neat version if writing out the work longhand.

REFERENCES

Check that the source of all material is cited, in the correct way, in the References section at the end. The reference list should not include literature not cited in the text

PRESENTATION

Ensure that your assignment is legible and neatly presented. Work that is poorly presented and difficult to read irritates the reader and may lead to loss of marks.

It is a good idea to ask someone, not necessarily a fellow scientist, to read through your written work and point out any shortcomings. Your proof-reader should be looking out for spelling and grammatical errors and checking for readability and organisation of the content. If you cannot find a proof-reader, then read the work aloud to yourself.

FAQs

How long should the work be?

There may be a set word limit but, even if there is not, it is bad practice to write too much. Word limits make you write concisely. They are not absolute, merely guidelines, but you should aim to keep within about 250 words of the limit.

If you exceed the word limit you are probably using inefficient language (i.e. 'rambling') and/or irrelevant material. If you have written too little then you probably have insufficient information and have not done enough research.

A common length for a written assignment is 1200 - 1500 words. This is 2-3 sides of typed, single-spaced A4 paper or 4-5 sides of hand-written text. If you type your essay, it will help the tutor who is marking it if you present it double spaced, in which case 1500 words will take up about 5 pages. No tutor is going to count every word but it is obvious if your writing is grossly under or over the limit.

How long should it take to write?

This depends on the nature and importance of the written work. Writing time is only a part of the total time required to complete the work. You should spend at least twice as long researching and planning as writing. When you are ready to write, find a quiet place where you are not going to be disturbed (not in front of TV!). Try to complete the first draft at one uninterrupted sitting of approximately 1-2 hours. This will aid concentration and produce a better result. Remember to allow further time for revision and editing.

How important is style?

This is a subjective issue but good style undoubtedly enhances a piece of scientific writing. Use formal, unemotional language.

AIM FOR

Concise language
Clarity
Short clear sentences
Clear paragraphs
Logical structure
Correct grammar, punctuation and spelling

AVOID

Repetitive language
Slang
Colloquialisms (language used in speech but not in writing)
Swear words
Incomplete sentences

AVOID continued

Abbreviations
Over-long sentences
Florid, ornate language
Over-enthusiastic language that cannot be justified
Sweeping statements

DO NOT OVER-USE

Personal pronouns such as 'I' and 'we'
Brackets
Side-headings or numbered points

REMEMBER

- **You are aiming for clarity and conciseness in both thought and presentation.**
- **Good presentation gives a good impression.**

Checklist for Essays

When you have finished your assignment, ask yourself the following questions and use the tick boxes to check that you have followed good practice:

- Have I followed the five-point plan?

Choice of topic

Research

Planning

Writing

Revision and editing

- Does the assignment have an appropriate title? Have I put my name on it?
- Is my assignment well-structured? Are the pages numbered and in the correct sequence?
- Is my writing style concise and informative?
- Is all the material relevant to the topic?
- Have I presented a balanced and rational argument, supported by appropriate evidence?
- Is the information included accurate and up-to-date?
- Have appropriate examples been fully explained and used to support the arguments?
- Have I shown that I have done some background reading by including relevant references?
Are these references cited correctly? Is the list of references complete and cross-checked against the text? Are the references written out correctly using the standard format?
- Are the figures and tables used relevant?
- Does each figure and table have a relevant title? Are figures and tables appropriately labelled (e.g. axis labels on graphs; row and column labels on tables)?
- Have I avoided repetition?
- Have I avoided colloquialisms and personal pronouns (I, we, etc.)?
- Are all scientific names underlined or italicised?
- Has the assignment been checked for spelling and punctuation (i.e. using the spell-check if it is word processed)?
- Is my work neatly presented and legible?
- Have I kept to within 250 words of the word limit?
- Am I satisfied with the assignment? Are there any lessons I can learn for next time?

KEY SKILLS

CHAPTER 4

How to produce good posters

What is a SCIENTIFIC poster?

A poster is a highly visual device for presenting ideas and information. It usually comprises of a display of text and figures, together with photographs or maps where appropriate. The aim of a poster presentation is to convey effectively a clear and informative message to the viewer or reader. The design of a good poster is a challenging task and you need to be aware of the guiding principles that lead to imaginative and effective communication. Posters may be presented individually but more commonly they may form part of a group poster session in which the authors are present and available to respond to questions posed by the viewing audience

The basics...

For effective communication you must first, and most importantly, attract your readers. Next, you must ensure that their interest and attention are retained for sufficient time for your message to be absorbed. How can you do this? What do you need to consider?

LEVEL OF READERSHIP

Be aware of the audience you are targeting and design a poster specifically to appeal to this target group. A poster aimed at junior school children will be very different from one aimed at practicing scientists, even though the overall message may be similar.

CONTENT

Choose the theme you wish to present. Ensure that the theme is focused and not excessively ambitious.

Design the text to fit the theme. Keep the text clear and concise, using simple sentences, and ensure that the subsections are balanced and follow a logical sequence.

Do not include too much information: it is your job to distill the essence of the information you wish to convey.

DESIGN

The overall design and layout of the poster will give it that eye-catching appeal that makes it initially attractive to readers. The use of shapes and colours, linked to the imaginative layout of text and figures can greatly enhance the appeal. There is good opportunity here to develop artistic and creative talent!

Simple design based on an elegant theme is preferable to cluttered overdesign.

Think carefully about the flow of the poster. Make it easy for the reader's eye to follow the logical sequence of sections.

TECHNICAL DETAILS

These include features that make posters legible, and easy to read. They cover such things as poster size and shape and the organization of tables, figures and other illustrations. One of the most important features is the selection of the design and size of the typeface (font) used and the manner in which this is varied within the headings and text of the poster.

Attention to the guidelines of good practice will not only result in a good poster it will also increase the probability of obtaining good marks.

Content

The aim and content of a poster can vary widely. Some posters may be of a general informative nature, such as presenting a summary of information about a particular environmental problem or giving details about selected aspects of the general features of a fossil or living group of organisms. Other posters (particularly at levels 2 and 3) may be focused on the results of scientific research, taking the form of a much simplified research paper and making use of the normal report headings such as Introduction, Methods, Results, Discussion and References.

Your choice of poster theme and the approach taken will be dictated by the nature of the problem you are addressing.

Whatever your choice of topic, select an appropriate attractive title and keep the content focused on that title. The title should be informative, summarising precisely the content of the poster, but should not be unduly long.

Write in your own words: never copy text directly from another source. Further useful information on how to present written information in various formats is given in your Key Skills documents entitled *Writing reports on Practical Classes and Fieldwork* and *Scientific Writing*.

Technical details (the poster ‘SPEC’)

The following recommendations should prove helpful in designing an effective poster. Remember, however, that they are general recommendations and that you may need to adapt them slightly to fit particular situations. For example, the size of the display board available may be smaller or larger than average. Determine beforehand that your poster will fit the display space available.

Overall size

This should be approximately 1.2 m high by 1.2 m wide, readable from a distance of 2 m. The poster should be mounted at eye level.

Title

Main heading should be in **bold** capital font, 25-30 mm high (100-125 point script in MS Word). The title should read horizontally left to right and should be placed at or near the top of the poster.

Authors

The name of every student involved with the poster should appear underneath the title. Details of all authors should be in **bold** font, 12-15 mm high (50-60 point typescript in MS Word).

Headings

Section headings, e.g.: Introduction, Results, Conclusion etc. should be in **bold** lower case font, 10-12 mm high (40-50 point typescript in MS Word). Headings may be numbered to aid continuity and improve ‘eyeflow’ through the poster.

Text

This should be in plain lower case font, at least 6-8 mm (26-34 point typescript in MS Word). Scientific names of all species mentioned must be in italics or underlined. Generic name must commence with a capital letter. Use a clear proportional font such as ‘*Times New Roman*’.

Figures & Tables

These should be no smaller than 150 x 150 mm, preferably larger. Aim to use typescript of at least 6-8 mm height (26-34 point typescript in MS Word). Figures (graphs, diagrams) should have no more than 4 trend lines per graph or 10 bars per histogram. Remember to label all axes and provide keys to all symbols used. Titles should be numbered, brief, and self explanatory. Never repeat information, i.e. do not give the same information in both Figures & Tables .

Maps

Use these to indicate the location of where projects were conducted or to illustrate such things as species distributions. Adapt and simplify source maps, removing all irrelevant information. Maps should be simple but include important landmark information such as the position of boundaries (reserves, national parks or political), important locations (names of countries, regions, towns or cities) and river systems. All maps must have a scale, a direction indicator showing north and a numbered title. Keep the size of text on maps to at least 6 mm, and refer to maps as Figures in the text.

Photographs

These should be 150 x 150 mm or larger. Each should have a numbered title and be referred to in the text as a Plate, e.g. Plate 1 etc.

Evaluation and assessment of posters

Tutors or module teaching teams will assess your poster. The following criteria will be used:

Content

Aim and purpose
Scientific background
Findings and solutions to problems
Scientific accuracy of figures, tables, diagrams and maps.
Conclusions
Clarity, conciseness and coherence

Design and technical aspects

Attractiveness
Eyeflow
Legibility
Use of colour
Effective use of graphics & illustrations
Quantity and layout of information

Personal presentation

Effectiveness at handling of questions
Enthusiasm of poster team

At Level 1 the emphasis will be on ensuring that you are capable of producing a technically proficient poster. The content will be of a more general nature and, while important, will not be given overriding emphasis. As you progress through Level 2 to Level 3 it will be assumed that these technical skills have been acquired and the emphasis will be placed firmly on poster content and personal presentation.

Before you prepare your poster, look at examples from previous groups of students. They are situated in the ground floor foyer of the tower block in the James Parsons Building and at several other corridor locations around the School. What do you think are the good and bad points about each one? Try to incorporate good ideas into your thinking.

KEY SKILLS

CHAPTER 5

How to give good talks

The basics...

There are four key components that you need to consider in order to make a successful presentation:

- **STRUCTURE & CONTENT**
- **STYLE OF DELIVERY**
- **USE OF VISUAL AIDS**
- **QUESTION HANDLING**

The answers to the following questions will determine your approach.

- **What is the aim of the presentation?**
- **What are the key points I wish to get across?**
- **How long have I got?**
- **Who are my audience and what do they already know about the subject**

Think about these questions and bear them in mind when considering the following four key areas of your presentation.

Structure

Choose an informative title that is likely to attract your audience. Make sure your talk has a definite beginning, middle and end. You cannot go to far wrong if you follow the tried and trusted guidelines:

- **Tell your audience what you are going to say**
- **Say it**
- **Tell them again what you have said**

Thus, the introduction should set out clearly what you are going to talk about and why. The introduction sets the talk within its context. When making your main points 'signpost' them for the audience so it is readily apparent what you are talking about, e.g. use phrases such as "From this it can be seen that..." or "This illustrates my second key point which is.....". When you finish your talk do not end abruptly. Summarise your main ideas and conclude by reiterating the most important point e.g. "What I have shown by discussion of A, B and C is that".

Delivery

No matter how well-structured your talk, it will be ineffective if you deliver it badly. You need to think about what sort of memory aid you use. Try to avoid A4 sheets as you will probably end up reading them, which will result in a poor presentation. A better idea is to use cue cards, which should be:

- **small and discreet (preferably so they fit in the palm of your hand)**
- **written on stiff card so they are easy to turn**
- **numbered in order**
- **hole punched and loosely tied (they stay in order even if you drop them!)**

When giving the talk:

- **Maintain eye contact with the audience throughout. Avoid looking at the floor, screen or overhead projector (OHP) as much as possible.**
- **Use gestures to emphasise key points, but avoid movements that may distract your audience such as fiddling with your keys, hair, glasses etc.**

- Decide beforehand whether you are going to sit or stand when talking. If standing, move around a little to keep the audience interested.

When speaking:

- Make sure you are loud enough to be heard and avoid speaking too quickly.
- Vary the tone, speed and volume of your voice, again to maintain interest and to avoid sounding monotonous. If you find yourself going too quickly take some deep breaths.
- Appear enthusiastic!

Visual aids

Visual aids are used to provide a structure to the talk (e.g. summary of key points) or to convey information in a way that is easy to understand (e.g. a graph, diagram or illustrative slide). You should only use visual aids if they add to or support what is being said. They should integrate well with the talk and not appear 'bolted on'.

The most common visual aid you will use is the overhead projector (OHP). The key to success when producing OHP transparencies is to make them, simple, uncluttered, bold and interesting.

Ensure that the text will be legible throughout the room in which you will be talking. As a rough guide each transparency should have no more than about 8 lines of evenly spaced text, using a 22 pt. or larger type face (although different fonts vary in size). Use unobtrusive colour on your transparencies for added interest. Blue, black and green project well: red, orange and yellow less so.

35mm slide projectors and computer/video projectors are also widely used, sometimes making use of professional presentation packages such as *Microsoft Powerpoint*. The same general rules of good presentation apply. If you are using 35mm transparencies ensure they are of good quality. Poor slides detract from the quality of presentation. A 35mm slide should contain no more text than can be typed within an area of 8x5 cm using a 12 point font.

Apart from text, think how best your information can be displayed. Will a graph look better than a table of results? Will a diagram or figure illustrate a point better than a page of text?

When using a projector:

- Know where the on/off switch is
- Know how to focus the image
- Ensure the image fills the screen but not the wall behind
- Set aside a table for keeping OHP transparencies in order
- Ensure the audience can see the screen.
- Do not stand in the way of the projector so that only part of the image is projected.

- Switch off the projector when not in use
- Do not look repeatedly at the screen.
- Use a pointer (e.g. pen) to highlight particular points. When using the OHP use a short pointer (e.g. pen) on the projector plate. Pointing at the screen with a stick exaggerates any nervous tremors in your arm!.

Handling questions

Responding to questions is an important part of any presentation. If you have delivered an interesting and entertaining talk then there will probably be several follow up questions. Anticipate what these may be so that you can prepare your answers. Tell your audience clearly when you will receive questions - preferably at the end so you do not lose the rhythm of your talk.

Answer the questions clearly and precisely. If you did not hear the question, ask for it to be repeated. If you do not understand the question, ask for it to be explained. Do not try to bluff or waffle: if you do not know the answer say so.

Dealing with nerves

Everyone is nervous to some extent before giving a talk. A degree of nervous energy generates adrenalin, which keeps you lively and ensures an enthusiastic performance. However, when your nerves get out of control this can impair the delivery of your talk.

The best way to reduce anxiety is to practice your presentation. If you are confident in your material and the quality of your visual aids this will reduce anxiety. Also, familiarise yourself with the room and the available facilities. Ensure you know where to stand, how to switch everything on etc. By preparing in this way you can minimise last minute worries.

The most difficult thing when giving a talk is to utter the first few sentences: once you get going you will be fine. To overcome this difficulty, rehearse repeatedly your first few points. Again this should help reduce anxiety when you get up to speak.

In the minutes before your talk avoid short panicky breathing, try to breath slowly and deeply (breathe through your nose to do this unobtrusively). Don't rush into your talk, get all your overheads and cue cards set out before beginning. When you are ready, begin with your prepared opening sentences and then the rest will follow without a hitch.

Things to check before giving your talk

Based on the lectures and presentations you have seen, write a list of things that make for a good presentation and those that contribute to a bad presentation. Include the former and omit the latter.

Then ask yourself the following questions in the sequence listed.

General considerations

- Does the presentation meet my overall aim?
- Is it suitable for the expected audience?
- Can it be delivered in the time available?

Structure

- Do I have a proper introduction explaining the theme of my talk and putting it in context?
- Do my key points follow on in a logical manner with sufficient signposting?
- Do I have a proper summary and a strong conclusion?

Delivery

- Have I got my cue cards sorted out?
- Am I going to sit or stand?
- Have I checked out the room and familiarised myself with the facilities?

Visual aids

- Are all my overheads and slides really necessary?
- Do I know how to use them?
- Are they simple, interesting and easy to read?

Handling questions

- Have I read up on my subject area?
- Have I thought about what I might be asked?
- Have I prepared answers for likely questions?

AND FINALLY... Practice...Practice...Practice !!!!!!!!!!!!!!!

Presentation feedback sheet

This is the kind of thing you may get back from a lecturer marking your talk. Have a look at what things they typically look out for!

Name of presenter:

| | Very good | Good | Average | Poor | Very poor |
|---------------------------|-----------|------|---------|------|-----------|
| Structure | | | | | |
| | | | | | |
| Introduction | | | | | |
| Sequence of material | | | | | |
| Coverage of material | | | | | |
| Summary | | | | | |
| | | | | | |
| Delivery | | | | | |
| | | | | | |
| Preparation | | | | | |
| Voice clarity | | | | | |
| Gestures | | | | | |
| Eye contact | | | | | |
| Timing | | | | | |
| | | | | | |
| Visual aids | | | | | |
| | | | | | |
| Quality | | | | | |
| Appropriateness | | | | | |
| Handling | | | | | |
| | | | | | |
| Question handling | | | | | |
| | | | | | |
| Knowledge of subject | | | | | |
| Clarity of answers | | | | | |
| | | | | | |
| | | | | | |
| Overall impression | | | | | |

Comments:

KEY SKILLS**CHAPTER 6**
How to pass exams**Introduction to exams**

During your time in the School of Biological and Earth Sciences you will be required to sit a number of formal exams. The style and content of the exams varies widely both among modules and between the different levels of your study programme. This document explains, with examples, the different types of exam question that you can expect, what the examiner is looking for and how you should respond to questions of a particular type.

The basics...

Before we consider the different styles of question there are three fundamental principles that apply to all exams:

BE PREPARED

Find out beforehand exactly where and when the exam is being held and set off early to make sure you arrive in time. Be aware of the likely format of the exam and prepare accordingly. Ensure that your revision is both timely and effective.

FOLLOW INSTRUCTIONS

Once you are in the exam room read the instructions to candidates on the exam paper and follow them carefully. It is surprising how many people answer the wrong number of questions or are unsure about the duration of the exam.

ANSWER THE QUESTION

Read the question slowly and carefully, taking great care to ensure that you are absolutely clear what it is asking. Your understanding of the question at this stage determines your response. One of the main reasons for obtaining low marks includes a misunderstanding of what the question is asking, resulting in the inclusion of material that is marginally significant or irrelevant. Always think about and answer the question set. Do not answer the question that you wished had been set or regurgitate notes uncritically in the hope the examiner might find at least part of your answer relevant.

Types of exam

Multiple choice questions

This style of exam is common at Level 1. For each question you are required to choose the correct answer from a set of possible answers provided (usually 5). Basically there are 2 types of question set,

those that test factual recall and those that test understanding. For factual questions there is usually a single correct answer. For questions that test understanding there might be several similar answers, some of which are wholly or partially correct but you may be asked to select the one that **best** answers the question set. Examples might be:

Factual question

17. *When did the dinosaurs become extinct?*

- a. 200 million years ago
- b. 50,000 years ago
- c. **65 million years ago**
- d. 100,000 years ago
- e. 650 million years ago

Question that tests understanding

19. *Ecological succession is best described as:*

- a. the growth of plants on newly formed land
- b. the colonisation of new habitats by invading species
- c. the response of plants to changing soil conditions
- d. **an ecological process that results in a directional change in the composition of plant and animal communities over time**
- e. the replacement of one species by another within an ecological community.

were found and what we now know about the historical geographical distribution of the species. Some questions might best be answered by graphs or diagrams. For example see next page.

9. Describe simply how a predator species may influence the population dynamics of a prey species.

To answer this question you might draw a graph of predator/prey densities against time to show how a predator species can limit the population growth of its prey and how this sets up cyclical fluctuations. Beneath the graph you should give a written account of the main points of the graph and point out any features you wish the examiner to note, such as the time lag effect between prey and predator population responses. You may wish to include details of an example such as the snowshoe hare/lynx cycle.

When short answer questions carry equal marks make sure that you spend an equivalent amount of time on each short answer. Do not leave answers blank because you have used up too much time answering another question you know a lot about. Remember it is much easier to score the first few marks on a new question than to gain extra marks on a question that you feel you have already answered well.

Extended answer (essay) questions

This type of answer can range from 0.5 to 1 hour or more in length and gives you the opportunity to develop ideas and to provide a longer detailed answer. At Level 1 this type of question will be fairly straightforward, testing your knowledge and understanding of information presented in lectures.

You will find that as you move through from Level 2 to Level 3 the questions will become more demanding, requiring you to think, draw together ideas from a variety of sources (including additional reading) and to synthesise your ideas into a coherent and reasoned form. At Level 3 do not expect simple questions requiring a straightforward learning of lecture notes. Questions are designed to test your abilities to the full and straight regurgitation of lecture notes will not achieve high marks. Similarly, irrelevant material will be ignored no matter how well it is presented.

You should consult the Key Skills 'Good Scientific Writing' for advice on how to produce good, well organised writing and you should get plenty of practice at producing written work within the tutorial system. Practice, coupled with a positive response to the feedback you receive, can produce dramatic improvements in the standard of your writing and make you more effective when tackling longer exam questions.

What are the examiners looking for in your answer? The five main things as outlined below:

EXPRESSION

How clearly and concisely are the ideas expressed? The length of an answer is no guide to its effectiveness. A well-structured short answer showing clarity of expression will gain much higher marks than a long rambling answer padded with irrelevant detail.

RELEVANCE

How relevant is the material? No marks are given for the inclusion of irrelevant material. Stick to the issues and points raised in the question and do not let yourself be side-tracked.

UNDERSTANDING

How well understood is the material presented? If you have failed to grasp the meaning of the question at the outset it is likely that your answer will be muddled and drifting away from the point.

ANALYTICAL ABILITY

How well reasoned and organised is the answer? A good answer shows a clear and logical structure to the material presented and displays evidence of the ability to draw together and reassemble relevant material from a number of different sources.

ORIGINALITY

Does the answer show evidence of original thinking, either as new ideas or novel use of existing data? is there evidence of imaginative incorporation of material from sources other than the lecture material?

During the early stages of your degree programme at Level 1 expression, relevance and understanding are the main criteria used to assess your work. However, by Levels 2 and 3, the emphasis changes: while previous criteria remain important, greater emphasis is placed on analytical ability and originality. At Level 3 a student who is capable of obtaining a very good Degree will tend to score highly on each of the criteria, particularly originality. A student who obtains a low grade Degree usually scores poorly on all criteria.

What do the marks mean?

Most of your work will receive a percentage mark on the scale 0-100%. A pass mark is usually 40%. Institutions of Higher Education in the UK also use a rather quaint scale for classifying degrees and your lecturers link their percentage marks to your achievements on this scale.

This scale is summarised on the next page.

Degree classifications and criteria

| Percentage mark | Degree class | Characteristics of answer |
|-----------------|-------------------------|--|
| <40 | Fail | Answers badly written, lacking structure, with largely irrelevant material |
| 40-49.9 | 3 (third) | Some relevant points remembered from lecture notes but answer generally poorly written |
| 50-59.9 | 2.2 (two-two) | Good coverage of lecture material. Material usually adequately but often not concisely presented. Limited evidence of extra reading |
| 60-69.9 | 2.1 (two-one) | Well written, with wide coverage of lecture material integrated with some ideas from other sources |
| 70+ | 1 (first) | Answers showing a high level of competence. Clearly and concisely written, incorporating ideas from other sources and showing flair and originality. |

Things to check before answering a question

Examiners tend to use particular words as shorthand to indicate that they expect a particular response from the student. It helps to be aware of what these words are and how you are expected to respond to them. The following words frequently find their way onto exam papers – look out for them and make sure you know what they mean!

ANALYSE describe, examine and criticise in detail

ASSESS weigh up and make a judgement

COMMENT express an opinion on

COMPARE examine the similarities and differences between

CONTRAST point out the differences between

CRITICISE point out errors and defects, make a critical judgement

DEFINE give the precise meaning of *or* show clearly the outlines of

DESCRIBE give a detailed account of

DISCUSS argue the case for and against (a conclusion is desirable)

ENUMERATE same as LIST

EVALUATE appraise, consider the worth or value of

EXPLAIN give a clear and intelligible case for *or* illustrate the meaning of *or* account for

IDENTIFY pick out the key features of

ILLUSTRATE same as SHOW but implying the use of appropriate examples

JUSTIFY Give reasons why. Show why this is the case

LIST Make a list of (usually with brief supporting information)

NAME same as LIST

OUTLINE Give a general summary or description but do not go into detail

SHOW Reveal in a logical and coherent sequence why

STATE Declare in plain language using sufficient detail as may be required

SUMMARISE Make a brief but coherent statement covering the main points of relevance

Revision and preparation

When preparing for exams you should pay particular attention to the following revision guidelines.

- You cannot revise effectively if your notes are inadequate or, worse still, non-existent!
 - Allocate the available time effectively. Draw up a realistic revision timetable, making allowance for unexpected problems. Adhere to the timetable.
 - Aim to do well in all subjects; do not neglect those that you dislike.
-
- Do not be too selective in your revision. It is dangerous to anticipate or “spot” questions. Examiners like to be unpredictable. Multiple-choice and short answer exams are particularly demanding in this respect as they ask questions from across the syllabus.
 - Ensure that your revision is effective and that you really are learning the material.
 - Do not think that the longer you spend revising the more you will learn. It is quality, learning time that matters. Be aware of how long you can concentrate effectively on your work.
 - Work in familiar and comfortable surroundings. Give yourself ample breaks for rest and relaxation. Use these as ‘rewards’ for completing a section of revision. Ensure that you get sufficient sleep, particularly just before an exam.
 - Use effective revision techniques such as making skeleton sets of notes, flow diagrams etc..
 - Make up acronyms to help you recall lists of information.
 - Devote time to thinking about what you are learning and to mentally linking different aspects of the subject.
 - Discuss ideas with your colleagues.
 - Test yourself to see what you can recall.
 - Look at and answer past exam papers.