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1  Studying Biosciences at Royal Holloway

Welcome to the School of Biological Sciences at Royal Holloway University of London. The purpose of this Study Guide is to introduce you to the School’s approach to teaching Biosciences and to provide guidance on how to carry out some of the basic academic tasks, including note-taking in lectures, reading and studying outside of lectures, writing laboratory and literature reports and preparing a Curriculum Vitae (CV). You should read through it all now and then keep the information in a safe place to refer back to later - for example when you have to write an essay or project report. Following the advice in this booklet will help you earn better marks.

You will also be given other electronic and printed information in your first few days in the School. The Undergraduate Student Handbook is a great source of information on degree programmes and course units in the School, coursework submission, examinations, and the facilities and services offered by the School and College. The Laboratory Books detail lab classes and safety regulations that define the commitment to safety and the codes of behaviour you will be expected to observe when working here. You must also read the Health and Safety Handbook which contains essential safety information, though not all the sections may be relevant to your activities.

To complement the information given in this Study Guide we provide you with a copy of Study and Communication Skills for the Biosciences by Johnson and Scott (Oxford University Press). Many of the notes in this booklet are amplified in the book, and much additional information of relevance to your studies is provided. We strongly recommend that you make use of these resources from the start!

The College also provides information and opportunities for co-curricular activities that can help boost your skills and therefore your career prospects; see https://www.royalholloway.ac.uk/careers/gainexperience/pdp/pdp.aspx. By using Personal Development planning you can develop a range of key skills that will boost your employability, making you more attractive to future employers. One of the stages in the process is for you to identify your strengths and weaknesses. Your strengths will be primarily your “career-relevant competencies”, in other words the skills and knowledge you acquire during your education and any extra-curricular activities. To assist you in this part of the process, you will find the transferable skills you can expect to acquire in each course offered by the School of Biological Sciences in Appendices 6-8 of this booklet. On pages 38 and 39 you will also find tables of these skills which you can complete as you progress through your degree programme. You can identify any skills that you are lacking and which you consider will be essential for your future career and so plan ways to acquire these. If you have any queries about PDP and your own record, please consult your Personal Tutor or the College Careers and Employability Service.

In summary, use this booklet wisely and you will be rewarded with an effective approach to your studies and enhanced academic outcomes. Enjoy the learning experience!

Dr J Murdoch (Director of Teaching)
2 Methods of teaching & learning

2.1 Lectures

In any science degree, lectures provide the main avenue for transferring new knowledge and understanding. You will have to adapt to a variety of styles and speeds of lecturing. Your job is to condense as much as you can of the material that the lecturer presents, both orally and in written form, into a set of coherent notes that will be intelligible months or years later. To succeed in this, you will need to read through your notes shortly after the lecture (ideally the same day) and clarify any uncertain points with the aid of a textbook, or using other sources recommended by the lecturer. In more advanced courses, you may also be referred to articles in scientific journals.

Lectures define your learning agenda – but they are no substitute for individual study. You will need to fill in the gaps in your notes, and do enough library research or textbook reading to grasp the material covered. Bear in mind that in science it is not enough just to remember factual knowledge; you must develop a thorough understanding of the subject material.

Keep your lecture notes carefully filed, together with all the relevant handouts, essays and coursework exercises. Do not discard notes as soon as you have passed the course; remember that parts of your final-year assessment could include material covered in earlier years, and later courses very often build on those in preceding years. Some of you will prefer to take notes on paper, others will aim to use electronic means. Whatever your individual preference, develop a system early on so that you can keep track of your lecture notes, add additional material to them, and be able to revise from them nearer the exam time. We aim to provide lecture slides in PowerPoint format, before the lecture, to enable electronic note-taking.

Attendance at all lectures in a course is an essential prerequisite for a good performance in examinations. The College sets a minimum level of attendance at 80%; if your attendance falls below this you may incur a Formal Warning. If you miss a lecture, for whatever reason, copy the notes up from a friend at the earliest opportunity; make sure you understand the notes fully, and ask the lecturer concerned about any points you can’t follow. If you are absent from a lecture for medical or other reasons it is important that you inform the School’s Teaching Office: you must submit a Notification of Absence form to the School’s Self-certification email address SBSself-certifications@rhul.ac.uk as directed in the Undergraduate Handbook. Legitimate reasons for absence can be taken into account when looking at your attendance record.

Each course is the responsibility of a Course Coordinator whose name is given in the Undergraduate Handbook and the Course Specification. Speak to them if you are having difficulty with any part of the course, or contact the lecturer.

Note-taking in lectures

Those of you who have had little experience of taking notes in lectures may find the following advice helpful:

1. At the outset it is worth remembering that the great majority of the lecture material,
particular in the 1st and 2nd year, can be found in the course textbook(s). If possible skim read the relevant material before the lecture, so you get a reasonable idea of the content beforehand and can therefore gain most from the lecture. You should be able to ascertain relevant material from the Course Specification provided for each course, or from the Moodle site.

2. Be punctual! Lectures will start promptly on the hour. You should be particularly attentive at the beginning of the lecture when the topic is introduced.

3. Do not worry if you miss a particular point - leave a space in your notes and concentrate on what comes next. Fill the gaps as soon as you can after the lecture having consulted the text books/references, your colleagues or the lecturer. Structural formulae can always be added after the lecture provided you record the name of the compound.

4. Ideally, you should make a neat copy of all notes taken at a particular lecture, preferably on the same day, while the subject matter is fresh in your mind. At the same time supplement them with information from the textbook and other references. You may find that it is too time-consuming to rewrite all your lecture notes neatly and an alternative approach is to write notes during the lecture which can be corrected and enhanced without the need for a complete rewrite. A good set of notes will obviously make the pre-exam revision period much more tolerable. Do consult the lecturer if there remains any confusion about any substantial aspect of your notes. During the Autumn and Spring Terms, you should aim to understand the taught material. If you do not do so, you will find yourself in considerable difficulty when you revise.

5. Develop a shorthand for taking notes using a combination of generally recognised abbreviations and symbols together with some of your own. For example: "Pn of G by ATP in Hepes cat. by GK: product G6P enters glycol. or convert to glycog" This reads "The phosphorylation of glucose by ATP in hepatocytes is catalysed by glucokinase: the product glucose 6-phosphate enters glycolysis or is converted to glycogen". Make sure that you use abbreviations consistently so that you build up your own dictionary of abbreviations which are easily remembered.

6. File your notes carefully and safely, whether on paper or electronically.

2.2 Reading

Independent reading is a vital ingredient of a good Honours degree. Science thrives on controversy and on fresh insights, and although in lectures we try to embrace opposing points of view and introduce you to stimulating new ideas, we cannot present the arguments as vividly as the combatants themselves; there is no substitute for reading the books and research papers in which the story unfolds year by year or month by month. To gain a good degree, therefore, it is essential that you read widely, to enhance your understanding, to broaden your knowledge of the science, and to keep abreast of progress.
**Recommended textbooks**

You will be given lists of texts in each year and also in the Course Specification. These are classified as “essential” or “recommended”. Ideally, the former should be purchased at the start of a session; the latter can be shared or obtained from the library if finances are limiting. Increasingly, core textbooks are available electronically, through the library website.

**Journals and magazines**

You should aim to keep abreast of major developments in Biological Sciences by browsing through current issues of more accessible science journals such as *New Scientist* and *Scientific American*. Good quality newspapers often contain articles on topics of current interest. By the time you reach the third year, you should be having a regular look at *Nature*, *Trends in Biochemical Sciences* or other *Trends* journals, and the *Current Opinion* set of journals. As you progress through your degree programme you will find that the expectation that you read original articles or reviews in addition to textbooks will increase, particularly for the final year courses.

**2.3 Tutorials and pastoral care with your Personal Tutor**

Tutorials are an important part of the School’s teaching and student-support strategy. They provide an opportunity for you to explore ideas and develop your understanding in a small informal group, to share experiences, to sort out academic and other problems, and to get advice on study and examination techniques. Your Personal Tutor will also set and mark essays which, as well as broadening your knowledge, will advance your writing skills. You will give short oral presentations to your tutor group, each year, to help you develop and improve your presentation skills. You may also go through specific exercises designed to help improve other skills, such as biological calculations. Tutorials are designed to make you think for yourself; a good tutorial is a melting pot of ideas - some good, some not so good - so don’t be afraid to put forward your own. Always take a note pad, and file the notes you take; you will be surprised how useful such notes can be later on.

Your Personal Tutor also has some responsibility for your pastoral care, and is the first person to approach for advice on academic or personal matters. (See your *Undergraduate Student Handbook*). It is important to establish a comfortable working relationship with them. He/she also keeps a watchful eye on your progress, will ensure that School records reflect any special difficulties you may be experiencing, particularly if they are likely to affect assessment, and will advise you on steps you need to take if you appear to be at risk. Your Personal Tutor is your most important point of contact with the School and College administrations, and will act on your behalf in case of difficulty. You can trust her/him to act discreetly if you have complaints or other concerns. Indeed the School welcomes student feedback through this and other channels; it will never be dismissed or ignored, though it is often not possible to resolve problems instantly.

It is vital that you notify your Personal Tutor about any personal or family crisis you may be facing, or if you are unhappy with the course or the College. Such information will be treated sensitively and discreetly but will help your tutor assess your personal circumstances and offer appropriate advice. They will judge, for example, whether it is appropriate to
refer you on to the Student Counselling Service or to the Disability and Dyslexia Services (DDS) for independent advice and support at a more professional level than the School can provide. You can of course approach either of these services directly.

Occasionally, students disclose information about problems to a specific staff member but do not wish to seek any further help. You should be assured that we commit to dealing with all situations discreetly and sensitively. You may be encouraged to share the problem with other appropriate staff members, including the Counselling or DDS service when appropriate, in order to gain the best possible support. Students who are adamant that do not wish to share their problem with anyone else will be asked to sign a disclosure agreement, noting that they are declining the offer of further support.

Using your Personal Tutor as a referee

Your Personal Tutor is the first person to ask if you need a reference for summer vacation employment or for post-graduate training or work. Always ask, however, before using their name on an application or curriculum vitae: the person concerned may be planning to be away on leave or at a conference that would make them unavailable at the critical time, or there may be other reasons why they cannot act on your behalf on every occasion. Moreover it is simple courtesy to ask first. You may find it helpful to let them glance at and comment on your CV before sending it to prospective employers, and it is a good idea to supply the office with a copy for your file.

When your Personal Tutor writes a reference for you, he or she will look at your entire record, including attendance at lectures, tutorials and practicals. Evidence of motivation, enthusiasm and reliability may be just as important a factor as high academic achievement in earning you a strong and supportive reference.

It is thus in your own interest to remain in regular contact with your Personal Tutor throughout your period of study and after you have graduated, keeping them acquainted with your career plans and progress. Often he or she will remain a personal friend long after you have left the College.

2.4 Practical training

Practical work lies at the heart of the majority of courses taught by the School. Practicals extend your understanding of course content, train you in essential practical skills and acquaint you with key methodology. Many practicals are designed so that you learn through investigation and are able to draw meaningful scientific conclusions for yourself, thereby gaining confidence in your own powers of reasoning. In some you will be required to form and work collectively in teams. Make sure that you listen to and understand the introduction to the lab class given at the start. Do not be afraid to ask questions.

You should take the following items with you to every practical class:

- the practical schedule or lab book which is usually provided in advance (please read this before the practical)
- any relevant textbook
• lab coat, and where required, safety glasses*
• a calculator
• marker pen, paper and graph paper where necessary
• A4 Laboratory notebook

Laboratory work is assessed, so you should take care to hand it in by the deadline specified. Take careful note of feedback written on your report, proforma or practical book when it is returned to you. All marked coursework should be carefully filed for future reference and revision. You may be required to return your portfolio of marked coursework if the External Examiners wish to see it.

Practical approaches and experimental investigation form an inherent part of biological science, and you will spend a significant amount of time in the practical labs. Practical skills are monitored to ensure individuals gain competency in the key skills. Indeed, this is a requirement of the Royal Society of Biology, in the accreditation of our degrees. Some courses include a practical exam, which will assess particular aspects of the techniques used. In other courses, individual competency will be assessed through submission of results from the practical investigations, or by direct observation of students by the lecturer and demonstrators, during the practical class. Ensure you fully and actively engage with the practicals, so that you achieve all the skills expected. Participating in the practical work is also great fun! You will find the time is much more enjoyable if you’re immersed in the practicals hands-on, rather than sitting as a passive observer.

It is natural to discuss what you are doing in a practical with your partner or neighbour, but it is very important that what you hand in is your own work. We cannot correct your misunderstandings and errors if you simply copy someone else’s work, even though in the short term this may gain you better marks. Copying work is a type of plagiarism (see the Undergraduate Student Handbook and the College Regulations) and all parties involved may be penalised by a loss of marks. For the same reason, do not simply write down what a demonstrator tells you; make sure you understand it first.

A summary of each course is given every year in the Undergraduate Student Handbook, and more detailed information is provided in the Course Specifications. Take particular note of the deadlines for handing in coursework: you are certain to be penalised if it is handed in late, unless you have genuine extenuating circumstances (e.g. medical) with supporting evidence. There may also be multiple different deadlines for the same practical, if it is run on multiple occasions, so make sure you’re aware of the deadline for the practical you have completed. You should make every effort to complete and hand in work by the deadline, but if there are genuine reasons why you’re not able to do this, you can apply for an extension to the deadline through the College extension request system. Extensions are not automatically granted, but individual circumstances are

* In general these are required for all laboratory classes where you are using potentially hazardous chemicals and/or procedures. The lab book will advise you if safety glasses are required. If in doubt, bring them along.
considered on a case-by-case basis, in light of the evidence you submit. Please note that heavy work-load is never a reason for granting an extension. If you have several pieces of work to complete within a similar time frame, you need to plan your time such that you allocate time to complete all pieces of work. You should also try to plan ahead and aim to complete your assignments before the deadlines, to allow yourself some leeway for possible problems, delays or occasional mild illness. Keep a diary to help keep track of when your assignments are due, and note also the deadlines for completing quizzes on Moodle. Even gaining a few marks from a short assignment or quiz can help boost your overall mark!

2.5 Computer skills

Undergraduates are expected to learn IT and presentational skills, during their degree, and these skills will be developed using the hardware, software and online training provided by the Royal Holloway Computer Centre. The Computer Centre offers several online tutorials and students are expected to take any that they require to reach a suitable level of skill, particularly for Word, Excel and PowerPoint. The Computer Centre operates a number of PC labs around the campus. You are entitled to use any of the computer laboratories on campus provided they are not in use for teaching. You should have a user ID number from the Computer Centre in your pack of initial registration details.

The applications packages that you use (Word, Excel and so on) will normally be stored on a network server. The first and most important place is on the (Y:) drive, which is your personal space on the Royal Holloway IT network. This stores your work on a server in the Computer Centre rather than on the actual PC you are working at, which means it is portable; you can log on to any PC in any of our open-access PC labs on Campus and access your (Y:) drive. Importantly, the (Y:) drive is backed up every night and is consequently the most secure place to save work. All the documents you produce will need to be stored as files. As it is a fairly quick process, we suggest that you save your document at least once every 10 minutes. The importance of this cannot be overemphasised and students who fail to regularly save their work on the (Y:) drive and as a back-up copy elsewhere may end up having a lot of extra work to do. The documents that you generate (essays, spreadsheets, reports, etc.) should also be saved on your own USB flash memory drive. When saving a document, it is vital that you ‘back up’ on a second USB flash drive, in case the first one gets lost or corrupted (an all too common experience); not doing so may mean the loss of all your work. Loss or corruption of files stored on a flash drive will not be accepted as an excuse for late handing in of work as you should always have a back-up copy. Also get into the practice of making a new “version” of a file as you update it, rather than having only one, in case your file (and the copy) become corrupted. Appending a date within the file name can be a useful way of keeping track of versions of your work.

2.6 The internet and web-based resources.

The internet and web-based resources are becoming increasingly important sources of material to supplement lectures, tutorials and laboratory sessions. Lecture handouts and /or PowerPoint slides and supplementary material for all courses will be made available on
the interactive Virtual Learning Environment (VLE), Moodle. Past examination papers are also available on this website.

**A caution on use of material available on the web.** Many websites provide an extremely valuable source of extra material. However, unlike journal articles and textbooks, not all websites are peer reviewed. Therefore the quality of the material varies enormously and at worst may represent an individual’s personal interpretation/opinion with no scientific facts to back it up. An example is the site Wikipedia which, whilst containing some interesting material, is not peer-reviewed and you are therefore strongly advised not to refer to this site in practical write-ups or essays. Therefore do use appropriate websites as a valuable resource, but remember to evaluate their quality and usefulness. If necessary, consult the academic member of staff responsible for setting the assignment if you are intending to supplement your work with information from the web. In particular, do not be tempted to copy text directly from a website into your assignment. See section 3.3 on Plagiarism below.

**Use of online journals and databases.** The library subscribes to many journals directly on-line and copies of articles may be downloaded from the web. A list of journals currently available on-line is available on the library homepage. Searching for relevant articles on a particular subject or by a particular author is now most conveniently carried out using on-line databases such as Web of Science (WOS).

Training in use of these facilities is provided by the library to all first year students in the School of Biological Sciences.
3 Guidelines for written work and oral presentations in Biological Sciences

Success in most professions depends on being able to write concise, well structured, informative reports or papers, which provide an important avenue of communication with your manager, your client or the scientific community at large. Without a good command of written English your professional opportunities may be limited.

The training you receive in writing good scientific English will be based on three kinds of written work:

• In the first and second years your Personal Tutor will expect you to write some essays. These provide the first step in improving your writing skills; your Personal Tutor will provide initial guidance on researching your essay, and constructive feedback on your work.

• In the third year, if you choose BS3020, you will be required to write a longer literature report (dissertation) on a topic that you have researched in the recent scientific literature.

• In the final year you will have to write a project report that, in addition to summarising the current state of published research on the topic in question, will report your own project objectives, measurements and conclusions.

Each literature report and project report will have to be prepared to a deadline, and must meet professional standards of presentation. The marks for literature reports and projects contribute to your final degree grade, and they may also be scrutinized by External Examiners. Moreover, work of this kind carried out in the final year provides an important indicator for Personal Tutors when they write references in support of your job or postgraduate studentship applications in advance of your final degree grade. It is therefore important to achieve the highest standards that you can.

This section is designed to give you a good idea of the style of writing required in Biological Sciences for essays, literature reports and project reports. It provides advice on the technical details, and warns you about common errors that you should try to avoid. Please read it carefully, and use it throughout your years of study at Royal Holloway; you may even find it helpful after you have graduated. There is also a section on the equally important professional skills of effective oral and audio-visual communication, which you will find useful when preparing for seminars. Further guidance is provided in the book by Johnson and Scott, so do refer to that also.

3.1 Style and Structure of Essays for Biological Sciences

Write simple, clear English

Your aim should always be to write lucid, concise English that is easy to read. General guidelines for writing essays are:

• Map out an outline of what you want to say. Starting to write without a clear mental or written image of the finished article often leads to a circuitous, turgid product. Always begin by making a list of the topics to be covered, or the points you want to
make, and devote a paragraph (or possibly several paragraphs) to each topic.

- Length: will usually be specified but, as a guide, generally 1000 - 2000 words maximum. If a rough draft is longer than specified, shorten it but seek to retain the same information content. **Be concise.** There is no merit in length for its own sake. Inflating an essay with repetition may only emphasise how little you have to say. **QUALITY NOT QUANTITY** is what matters.

- Do not be tempted to write in a stilted pseudo-scientific style as a substitute for real precision and clarity of ideas. Jargon should be used only when it communicates better than plain English.

- You should write legibly and use **clear, correct English.** Spend time constructing good sentences, checking spelling, and inserting punctuation. Use paragraphs intelligently. When you have finished the script, **proof read it** - preferably a couple of days after you have written it out. This will allow you to check for spelling errors, grammatical flaws, interpretation errors, and areas of confusion which you can rewrite as necessary. A useful aid is a dictionary to check the spelling and, perhaps more importantly, the meaning of words. Be extra careful if you rely on a spell-check in a word processing package.

- Latin names of organisms should be printed in **italics,** or **underlined** when writing by hand.

- Essays are often clearer if they have headings such as Introduction and Conclusion, with appropriate intermediate headings and sub-headings for the main sections. Whether you use headings or not, the essay should have a beginning, a middle and an end. The beginning and end may occupy 100 - 200 words, perhaps more in some cases. A single summarising sentence is not sufficient for the end section but do not be tempted just to repeat statements already made.

- Use diagrams, graphs and tables wherever they are appropriate (that is where they provide additional pertinent information), number them sequentially, and **refer to them in the text.** Make sure you supply titles, legends and labels together with the source of the item if you have copied it from a book or research paper. Remember that data are frequently easier to assimilate and understand when presented as figures (i.e. diagrams, graphs, pie charts, etc.) or tables rather than as a long piece of text. Do note that you should refer to these items either as a Table (if that is what it is) or a Figure, which can take many forms: sketches, photos, graphs, bar charts etc. Do not refer to these as “graphs” or “images”, they are all Figures.

- Remember: if you train yourself to write good plain English, to write succinctly in a precise style appropriate for science, but without painful jargon and lengthy expressions, it will make answering examination questions easier. It will also benefit you when you leave the university to follow a career.

- **Hand in your work by the due date:** late submissions (except for authorised extensions) will incur a penalty. Refer to coursework submission on section 9 of this booklet for further information.
Listing of references at the end of an essay or report

A major feature of scientific writing is the strict attention paid to accuracy, especially when quoting the work of other scientists. It is, therefore, important to list your sources.

A list of books and research papers used as sources should appear at the end of your essay under the heading REFERENCES as indicated in the following examples. These references are likely to be of 4 types:

(a) General sources: Text books, which you have read for your essay.
Author(s), Initials. (Year of publication) Full title (in italics). Publisher, Place of Publication.

(b) Primary sources: Research papers (original work) which you have read yourself in the original and quoted in your essay.
Author(s), Initials. (Year of publication). Full title of the paper. Journal title in full (in italics), Volume, Pages of the whole paper.

(c) Secondary sources: These are review articles or monographs (specialist texts) which critically assess and interpret the work of the primary sources in a specific area of investigation. You will often be given secondary sources to read because they are a bridge between the introductory level material of general text books and original research published in primary sources.

(d) Websites: There is a wealth of information on the internet, and this is easily accessible via the College computer network. Be careful, however, in using this as a source of accurate unbiased information. Many sites are created by individuals or groups who may have a biased view of scientific literature or knowledge. You should check the source of the site to see if it has credibility in this respect. Always quote the website address in your references. For example,
http://www.brenda-enzymes.info/php/result_flat.php4?ecno=1.11.1.1
(Last accessed 20th Aug 2012)

All the sources should be listed together in a sequence determined by the alphabetical
order of the (first) authors’ last names. Contributions from the same author(s) should be listed in chronological order (oldest first).

More detailed guidance on citing and referencing is provided in the SBS Citing and Referencing Guide, so please do refer to that document.

3.2 Uses of sources by different levels of student

(a) First year students. Although you may be asked to use a few secondary, or occasionally primary sources, most of your information will come from textbooks. Always try to read at least two different accounts of your topic. Remember - textbooks do make mistakes from time to time, and may be biased in one way or another. The same applies to lecturers’ notes. You are encouraged to read occasional secondary and primary sources but it is not usually expected routinely as it is for second year students.

(b) Second year students. You will normally use secondary, and general sources but some relevant original papers will be recommended to you. Even though you will seldom need to use original papers as source material for essays, you should get into the habit of reading primary sources. You should always make sure that you read about the essay topic in more than one textbook or review, otherwise you are likely to get a biased or incomplete coverage of the topic.

(c) Final year students. By now you should be writing well-constructed essays, making use of the full range of literature. For most work, you will be using original papers (i.e. primary sources) as part of your source material. Some of these sources you will be expected to find for yourself. Remember that Web of Science or PubMed can be used to find additional references. Authors whose work is relevant will appear in the text of your essay.

For example "Jones (2011) claims that ..." or if Jones, the first author, were followed by several others then it would be "Jones et al. (2011) claim that ...", or you could say: "according to Jones (2011) ..." Or another way: "Mitochondria in vivo were reported to function only intermittently (Jones 2011) ... however, in vitro this is clearly not true (Brown & Jones, 2012)".

There are numerous ways of referring to other scientists’ work. Anything you quote in the essay must have its source properly cited in the reference list. You will, of course, also be using secondary and general sources. Please read the SBS Citing and Referencing Guide for more detailed information.

3.3 Plagiarism

Please ensure that you have read and understood Section 7.11 (Plagiarism) of the Undergraduate Student Handbook. The following are additional tips on how to avoid plagiarism in individual as well as group work:

In preparing your coursework you will use a number of different sources: course materials
(e.g. practical handouts), books, scientific papers, websites and possibly conversations with other students and staff. All of these are necessary for the preparation of your assignments. However, it is essential that you always acknowledge your sources, supplying a full reference to authorship (e.g. name and year) and full details of the source (see sections 3.1 and 3.2 above and the SBS Citing and Referencing Guide for more detailed information on citation and listing of references). The marker of your assignment requires evidence of your understanding and effort; borrowed material that is unacknowledged attracts no marks.

Two of the commonest forms of plagiarism are:

1. Fraud. This applies when a student submits the written work of another person (who might be a fellow student)–in whole or part–as his/her own. Such fraud may occur with or without the author’s consent, but having obtained the author’s consent does not excuse the crime! Deception of this kind devalues the work of the perpetrator and is grossly unfair to his/her peers. Markers find this easy to spot as they keep some record of the work of past or present students.

2. Pirated text. This refers to copying text (sometimes word for word) or memorizing and reproducing text from a publication. Pirated text is not difficult to detect, for even if the marker does not know the source of the text (but often he/she will) the style of the plagiarised text betrays the fraud. The cohesiveness of argument, the structure of the text (formal scientific writing has a form seldom found in student essays) and English usage, always differ substantially from the usual output of the plagiariser.

NEVER COPY WORD FOR WORD DIRECTLY FROM ANY TEXT. If you wish to use text verbatim from a published source you must place it inside quotation marks (“…”), with a citation of the source. Normally, you should seldom need to quote word for word from another author unless that author happens to make a point you wish to stress in a peculiarly apt way which you think worth repeating exactly. For example, a correctly used direct quote in an essay could be as follows:

...As Sheridan (2010) has stated, "Fluorescein is not an ideal tracer, however, because it is a weak acid, and its undissociated form, though in low concentration at neutral pH, crosses cell membranes." Therefore, the use of fluorescein should be restricted to...

If, on the other hand, you had simply written:

...Fluorescein is not an ideal tracer, however, because it is a weak acid, and its undissociated form, though in low concentration at neutral pH, crosses cell membranes. Therefore, the use of fluorescein should be restricted to...

then it becomes plagiarism; you are pretending that the words are yours. Even if you had included a citation, this would still be regarded as plagiarism, as you have given a word-for-word copy of the text. This is deceitful and is regarded as a serious matter.

But remember, we want to see evidence of your understanding. A piece of work consisting substantially or entirely of quotations provides little evidence of your understanding of a topic, and will attract few marks. The same is true for extensive paraphrasing of another author’s words. Always use your own words, your own phraseology, instead of stealing...
those patterns of words belonging to other authors. Essays which are mixtures of copied sections linked by sections in your own words are readily detected due to the changes in style, levels of literacy and increasingly across the School by the use of Turnitin detection software. In addition, when you come to the examinations you will find problems in expressing yourself adequately if you have got into the habit of using other people’s words to compile your essays.

**Group Work**

Group work is an area where students may be unsure, justifiably, about whether their submitted work constitutes plagiarism. The group work you will encounter may encompass:

1. Presenting seminar papers as a group, with some or all group members participating in the presentation, but all contributing to the production; or project work in groups, e.g. producing posters.

In these types of coursework, you will be informed of the degree of permissible collaboration between group members in producing assessed work, but an individual contribution from each member of the team is expected. You must list the group members on the cover sheet of the work submitted.

2. Collecting results in practical classes as a group.

In many classes you will perform laboratory experiments together with one or more other students. In such classes, you will collect data as a group and will be encouraged to discuss the findings amongst yourselves. The assessment will usually take the form of a written report, and it is in production of this that plagiarism may arise.

You must do two things:
- declare in your report the members of your group, and
- ensure that your report has a content that is distinctively yours.

This distinctiveness will be possible:
- in any introductory section(s) of the report
- in the tabular and/or graphical presentation of the data
- in the text describing the results
- in the discussion where you interpret the findings.

The key to dealing with group work is to ensure that your coursework assignment has a content that is distinctively your own. You are expected to produce such elements through your individual effort and not by copying text, graphs, mathematical work, etc. performed by others. Think about your own answers to questions – don’t just copy those of someone else. If you are at all unsure of the degree of permissible collaboration pertaining to a particular group work assignment, please consult the lecturer who set the assignment: he/she will be happy to clarify the requirements.

In summary, you must ensure that all work you submit is entirely your own, unless you declare otherwise. Remember that plagiarism will incur severe penalties, which may include termination of your registration with the College. Further details about plagiarism and procedures for investigation of suspected cases can be found in section 7.11 of the
Undergraduate Handbook.

The Moodle-based exercise Avoiding Plagiarism can be found at http://moodle.rhul.ac.uk, within Academic Skills and Study Support. You will also have the opportunity to complete an exercise about plagiarism in the first year tutorial programme.
4 Interpretation of essay titles

A MAJOR FAULT of students at all levels is failure to analyse titles and questions. It is essential that you analyse them in depth, to extract all the shades of meaning beyond the obvious. You should always bear in mind that considerable thought goes into the exact wording of essay titles and examination questions, and all possible interpretations are considered very carefully. It should be obvious that if you do not think in depth about a title, however simple or obvious it may appear at first sight, your chances of producing what the examiner wants are slim.

In the introduction to your essay, you ought to discuss your interpretation of the title, and define any specialist terminology or any ordinary English usage having a different specialist meaning. After considering the possible interpretations, you should consider whether to write about all, or only some, of them. Whichever you decide, the reasons for your decision should be described so that the reader can see why you have adopted a particular approach. Then, you can describe the plan of your essay, and move onto the essay proper perhaps by briefly covering the background of the material which will form the body of the account.

In the main part of the essay, you should try very hard to prevent it becoming little more than a list or catalogue. The purpose of essays is usually to get you to discuss, that is to comment on, to make judgements about, to put into context the facts and experiments which form the raw material.

There are four styles of title/question which occur frequently. Examples are given below, followed by a brief explanation.

(a) Describe ...
   Give an account ...
   List the features of ...
   These phrases mean that facts are wanted, that is, more or less straight description. Discussion of the facts can be kept to a minimum but should not be omitted.

(b) Discuss the role of ...
   Discuss the structure and function of ...
   Elucidate the relationship between ...
   Critically evaluate ...
   These phrases want discussion of the facts. Just presenting the facts without comment is not sufficient. You should be using the facts to tell your story; you will evolve a theme for your essay and the facts will be evaluated and balanced against one another. They also require an interpretation of the information, e.g. are there different hypotheses to explain the same data. What is the evidence in support of each hypothesis.

Make absolutely sure that you understand the difference between Describe and Discuss. If asked, for example, to "describe the table at which you are sitting", you would find it easy:
..flat top, 4 legs, made of wood (or whatever), etc ... However, had you been asked to "discuss the table at which you are sitting", what would you say (or write)? Think about it!

(c) Compare and contrast X and Y ...
Discuss the similarities between X and Y ...
Here some knowledge about the basic facts is assumed. You are being asked to highlight certain features or aspects of the facts. If you do not do this, you will receive few marks. It is NOT good enough merely to list the features of X, followed by a description of the features of Y, and then to conclude with one sentence saying "Thus it can be seen that X and Y are similar/different".

(d) Write an essay on ...
This sort of title leaves you to your own devices because it is quite unconstricted. You must naturally discuss – it is particularly important to analyse the topic carefully, describe the aspects of it, decide and justify your approach and, in the final analysis, to present a balanced account of the topic.

ESSAYS IN BIOLOGICAL SCIENCES SHOULD INCLUDE EXPERIMENTAL EVIDENCE for the main observations and theories quoted and the critical techniques used, where appropriate. If the title specifically requests experimental evidence and/or techniques, then your answer should stress it/them to a greater extent. Where appropriate, structural formulae should be included in your answer.

4.1 Interpretive questions

It is difficult to give exact advice on answering this sort of question because each question is different. Here you are generally asked to interpret the data and information given to you. In order to do this, you may need to:

- process the data, or
- plot a figure such as a graph, or
- explain the findings, etc, and finally,
- draw conclusions.

Interpretive questions are usually relatively simple and are not designed 'to trip you up'. They aim to assess how well you can use your subject knowledge and experience. In coursework (but not examinations, obviously), an additional aim may be to get you to use the literature. Very often, they are based on practical and tutorial exercises, so the chances are that you will already have had some practice. If you have difficulty with such questions, practise doing as many examples from previous papers as you can - you will benefit enormously from this.

Here are some general guidelines to follow:

(a) Read the question carefully: the instructions are often fairly lengthy but the aim is to lead you through the exercise.
(b) Always explain (briefly) what you are doing.
(c) Record all calculations and workings (however rough), so that in the event of a mistake (e.g. an arithmetical error) credit can be awarded for those steps which are correct.
(d) Check that the answers make sense!
(e) Ensure that your presentation is good and that your train of thought can be easily followed by the assessor.
(f) Although a computer or calculator may provide numerous decimal places or significant figures, which you should use in calculation, answers should not normally be given with more than one more significant figure than the raw data; you cannot generate precision by calculation!

4.2 Review essays

Review essays will not form part of conventional examinations as they demand access to literature. You may be asked to review a very specific subject in an examination but, in this context, the essay may be treated as in (d) above.

Review essays for tutorials or coursework will usually be longer than conventional essays; ensure that you know the required length and do not exceed it. They will also take longer to prepare.

The objective is to obtain and summarise different viewpoints on the subject, appraise them on the basis of the evidence presented, and form a considered judgement on any controversial elements. Evidence is essential as you are likely to need to read widely (including primary sources) and your reference list will almost certainly be longer than normal.
Important tips on how to write a good essay

Here are some general guidelines to help you begin in the right way.

**DOs**

1. **Read the title carefully** and make sure you know what is required.

2. **Sources of information**. Research your literature sources in good time. You may be given a list of references, or a single key reference from which other sources of information may be gleaned. Delays may arise (e.g. while the Library recalls a book from another reader).

3. **Carefully plan the structure of your essay** before you start writing. A disordered structure leads to repetition and the omission of important aspects; it also makes the essay much harder to read. Decide on the extent of subject-matter to be covered in your essay, break it down into sections, each under an appropriate heading (e.g. introduction, conclusion), and sketch in the individual topics you intend to include under each heading. These headings should appear in the final essay to help the reader to appreciate the structure of your essay.

4. **Check the relevance of the content** before writing the final version.

5. **Illustrate your essay with appropriate diagrams or tables**. You should cite the source of each diagram (or table). Make sure that you supply titles, legends and labels.

6. **Ensure that the facts are presented before the speculation** (unless the purpose of your essay is to compare two conflicting hypotheses in the light of available data, in which case the theories can be summarised first).

7. **Avoid woolly generalisations**. One concrete example is worth a page of generalisation.

8. **References**: finish off the essay with a list of the sources of information you have actually used. Make sure that all the references that you cite in the text are listed in the reference section and that all references listed in the reference section are cited in the text. No reference should be cited that you have just read for extra information but have then not cited information from.

9. **Read through the essay** before handing it in: there will inevitably be mistakes that need correcting. Check the spelling of any words you are uncertain about (if you have written the essay on computer, it is sensible to run it through the spell-checker provided in the word-processing package, to highlight any spelling and
grammatical errors*), and make sure the punctuation is correct and conveys the meaning you intended.

DON’Ts

i. Don’t put off your essay writing until the night before the deadline.
ii. Don’t pad out an essay with irrelevant material or repetition.
iii. Don’t use fancy words unless you are sure what they mean.
iv. Don’t string sentences together with commas.
v. Don’t write or print to the edge of the page. Leave a margin of at least 3 cm (1.5 in) on left and right for binding, and for marker’s comments.

Some Common Pitfalls

Watch out for the following common errors:

1. **Plural versus singular.**

<table>
<thead>
<tr>
<th>Plural</th>
<th>Singular</th>
<th>Examples of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>data</td>
<td>datum</td>
<td>Incorrect: ’This data is ....’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Correct:  ’These data are ...’</td>
</tr>
<tr>
<td>criteria</td>
<td>criterion</td>
<td>Incorrect: ’The criteria we apply is ...’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Correct:  ’The criterion we apply is ...’</td>
</tr>
<tr>
<td>phenomena</td>
<td>phenomenon</td>
<td>Incorrect: ’Such a phenomena is ...’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Correct:  ’Such phenomena are ...’</td>
</tr>
</tbody>
</table>

2. **Commas** - the comma is the most abused item of punctuation in the English language. Commas may be used either singly or in pairs:

**Single commas**

‘When used singly, commas indicate a pause or a logical division of a sentence.’

In that example the comma separated a subordinate clause. Commas may be used to divide up lists of three or more items:

‘Left, right or straight on?’

A comma may also help to indicate the structure of a long sentence by separating two statements that are linked by a conjunction:

‘Island arcs lie above subduction zones, but the precise connection between ...’

* The spell-checker is no substitute for a good dictionary, however, for example are you sure of the difference between ‘principle’ and ‘principal’, or between ‘effect’ and ‘affect’, or between ‘dependent’ and ‘dependant’?*
subduction and melting remains a matter of debate.'

Note that a comma should never be used to separate two sentences that are not linked by a conjunction. Thus the following usage is incorrect:

‘Micas are phyllosilicates, their atomic structure is arranged in sheets.'

Correct alternatives are:

‘Micas are phyllosilicates. Their atomic structure is arranged in sheets.’

‘Micas are phyllosilicates; their atomic structure is arranged in sheets.’ [The semi-colon (;) recognises that the two statements are closely linked.]

‘Micas are phyllosilicates, and their atomic structure is arranged in sheets.’ [The statements are linked by the conjunction ‘and’.

‘As micas are phyllosilicates, their atomic structure is arranged in sheets.’ [Here the comma merely delimits a subordinate clause (‘As ....’)].

**Paired commas**

These perform the same function as parentheses (= brackets):

“Modern English, especially written English, is full of bad habits which spread by imitation and which can be avoided if one is willing to take the necessary trouble.”

Thus wrote George Orwell. The sentence has the same meaning as

‘... English (especially written English) is full of bad habits ...’

Note that this meaning is lost if either comma is omitted.

3. **The apostrophe** is used to indicate

(a) possession:

e.g. Emma’s book. Mr. Jones’ umbrella\(^1\). The Atkinsons’ house.

(b) abbreviations in spoken English\(^2\):

e.g. it’s mine, that’s OK, the Sun’s shining, mustn’t be late, we’ll see.

However, to avoid confusion, the apostrophe is by convention used in it’s only to

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\(^1\) The alternative form Mr. Jones’s umbrella is acceptable but not recommended.

\(^2\) ... and therefore not appropriate for written scientific English.
denote an abbreviation, not possession:

‘Look at that cat: it’s licking its paw.’

With one exception, do not use an apostrophe to denote a plural:

Incorrect:  CFC’s, 1990’s  
Correct:     CFCs, 1990s.

Exception: “dotting your i’s and crossing your t’s” is acceptable.

4. **Usage.** The following have the same meaning:

‘The BSc degree programme in Biochemistry *comprises* a series of course units...’

‘The BSc degree programme in Biochemistry *consists of* a series of course units...’

‘The BSc degree programme in Biochemistry *is composed of* a series of course units...’

To write that something ‘is comprised of’ is incorrect.
6 Oral Presentation

You will give oral presentations in all 3 years of study, often related to tutorial work. Bear the following points in mind when preparing an oral presentation:

a. **Assess how much material you can present** in the time allowed. You will not be able to cover all of a 2000 word essay in a 15 minute talk.

b. **Select the subject-matter carefully**: pick out the topics which you think your audience will find the most interesting. List the headings on a PowerPoint slide, an overhead acetate or on the board.

c. **Know your subject inside-out**. Last-minute preparation of material for oral presentation is rarely successful.

d. **Never just read verbatim from your essay** - a deadly experience for your audience. Spoken and written English are quite different animals. Prepare skeleton notes specially for your talk, and then just speak naturally to your audience using the notes to prompt you only when necessary.

e. Practice your talk a few times in private to check on length. Prepare informative PowerPoint slides showing simple figures, tables or ‘bullet point’ lists to help your audience to assimilate the information or appreciate the structure of your talk. Do not pack too much detail into each slide. Although it is important to produce high quality visual aids ALWAYS REMEMBER it is the quality of the information you present that is of most importance. Omission of important facts or data, or poor understanding of the material cannot be disguised by use of sophisticated slides. Further tips are given in Appendix 5.

**The role of the audience**

At its simplest, all the audience has to do is sit there, preferably listening, making notes and inwardly ‘digesting’ the information. Almost all talks of any sort suggest questions. If you think of a question during a seminar, lecture or even a tutorial, write it down immediately. Most speakers like to be asked questions about their subject, so ask them.

As a student, you should use tutorials and seminars to ‘break yourself in gently’ to this task by developing the courage and later the habit of asking questions. Of course, you may not simply wish to question but rather want to comment on what is said, disagree with it, add further information to it, and so on.
A literature report (sometimes known informally as a 'dissertation') is a more extended piece of writing, usually drawing on recent scientific papers in a particular area ('primary' sources). Through writing a literature report you will learn how to research the scientific literature, compile a review of recent work or ideas, and weigh up the merits of conflicting arguments and theories.

You will find full instructions on the requirements, preparation and submission of your dissertation report and its marking criteria in the BS3020 Handbook.
8 Practical reports

These notes are concerned with the presentation of written practical reports in the School of Biological Sciences. They indicate the types of report required and how to structure the information.

8.1 Types of practical report

1. **FINAL YEAR PROJECT REPORT**: This is a major report (6,000 – 8,000 words) required for Final year projects. Detailed instructions are provided in the "BS3010 Project Handbook" which is available to all project students.

2. **FULL WRITE-UP**: This is the longest form of report required for some practical exercises. **CONCISENESS and QUALITY are required - not quantity.** A maximum of 1500 words (but usually less) for the overall report should suffice.

   A practical report should take no more than 3 - 4 hours to write, assuming that you have made BEST USE OF THE PRACTICAL PERIOD by:
   (a) reading the schedule before the class,
   (b) carefully recording your observations and measurements,
   (c) keeping up with any relevant theory (from lectures or reading), and
   (d) writing up as soon as possible after the practical class while it is still fresh in your mind.

3. **ABBREVIATED WRITE-UP**: This is an abbreviated form of the full report and generally involves reporting only the results (plus comments or a brief discussion) of a practical exercise. The format may vary according to the nature of the work. The introduction and methods will have been given in the schedule and should not be rewritten fully except for significant alterations.

   Abbreviated write-ups are a concession to students to save them time but the subject matter is no less important than that which requires major reports; they should help to train students to WRITE UP AS THEY WORK - a very important aspect of practical work - since the reports (often in the form of result sheets plus comments) have generally to be handed in at the end of the practical classes to which they refer. If further work is required, an abbreviated report should not normally require more than 1 - 2 hours to complete, often less.

4. **PROFORMAS**

   For some practical classes, particularly in the first year, you will be provided with proformas that you will use to report your results. These may ask you to include specific data, tables, graphs and calculations, and to answer specific questions or discuss specific points related to the practical. Often no additional supplementary material is required, or indeed, will be awarded any marks. Some proformas are handed in at the end of the practical session.

   **FORMATIVE PRACTICALS**: some practicals (particularly for first year courses) are used entirely to give you feedback on how to write up your laboratory sessions. The marks
for these do not count towards your final course assessment. You will be clearly told where laboratory pro-formas or reports are for formative assessment purposes only. Remember, it is compulsory that you complete and hand in these formative assessments.

In the first year there are one or two formative practical assessments for several of the course units and, typically, they occur early in the course to give you the maximum opportunity to benefit from feedback.

**With the exception of formative practicals, all practical marks count towards the overall coursework marks.**

### 8.2 Structure of practical reports

Information about structuring practical reports is also given at the front of the lab books, and should be read in conjunction with the information below. In addition, some academics may give more detailed specification for what they expect for individual practical write-ups. Look out for these and follow what is required. Below is some general guidance.

Reports should normally be divided into 5 (or 6) sections as follows:

1. Introduction
2. Methods (and Materials)
3. Results
4. Discussion
5. Conclusions
6. References

**1. INTRODUCTION:** This should comprise 3 sub-sections whose relative lengths will depend on the practical in question: (a) Background, (b) Principles, and (c) Aim(s) of the experiment(s). **BE CONCISE AND RELEVANT.**

(a) The practical exercise has some relevance to a particular area of Biology or Biochemistry. Describe briefly how it fits in.

(b) Certain principles are to be tested or certain features are to be demonstrated in the practical exercise. Briefly describe them here bearing in mind that these will be referred to in the Discussion section. It is not essential to describe the principles of all the techniques involved; use your judgement. For example, it would not be expected for you to describe the principles of spectrophotometry simply because a spectrophotometer was used in an experiment on, say, enzyme kinetics. On the other hand, if the exercise was on plant distributions, then the principles of sampling may well be relevant.

(c) The aims of a practical exercise SHOULD ALWAYS BE STATED. One or two sentences should be sufficient. For example: "The aim of the experiment was to assess the efficiency of various homogenisation techniques in disrupting yeast cell suspensions".
2. **METHODS**: Describe clearly, using the **PASSIVE PAST TENSE** and in the **third person**, exactly how the procedures were carried out by **YOU**. Use sub-headings for clarity. Again, it can be assumed that basic techniques, such as for example how to use an oscilloscope or how to pipette accurately, are common knowledge: use your judgement. Make clear what you did, what was done for you by demonstrators or technicians and what was done as a class exercise. **CLARITY IS MOST IMPORTANT.**

Very often, A FULL WRITE-UP OF THE METHODS IS NOT ASKED FOR. Check in the schedule first and then with the member of staff in charge of the practical if you are still unclear. If it is not, then you MUST nevertheless include one or two sentences along the following lines: "The procedures used in this experiment were carried out as described in (sections X,Y, etc.) of the (attached) schedule (entitled '.....') **but with the following modifications**". Then, write out the significant changes or deviations from the schedule - either intentional or accidental - and note if you have pooled data with other students.

The Methods section is also the place to describe how raw results were processed and which statistical tests (if any) were applied. Again, assume that the reader (assessor) will be familiar with basic procedures such as how to read a calibration curve or do a t-test.

3. **RESULTS**: This is the place in which to present **TEXT** as a general **ACCOUNT** of the experiments done, selecting only the **IMPORTANT DATA** to describe. Data should be presented, as appropriate, in tables, figures, (drawings, histograms, bar graphs, etc.), but not necessarily in their raw form. Figures should appear in the text as close as possible to the point of reference but they should be **INCIDENTAL** to the reading of the text, that is, the text should be **INDEPENDENT** of the tables and figures and give the reader an idea of what experiments were done (in general terms) and what the author thinks were the significant findings. For a comprehensive view of the results, the reader may then elect to study the tables and figures. Thus, the text might read:

"A sample (2 cm³) of extract was applied to the Sephadex G50 column. Recovery of the acid phosphatase activity was 75% (Table X) with the bulk of the enzyme eluting in the void volume (Figure Y)...."

It is also important to indicate in which Table or Figure the results of the experiment(s) can be found. Another example:

"Table 1 shows the number of invertebrate species in the series of ponds examined. It can be seen that the number of species increased with nitrate concentration (Fig.1) but the relative number of individuals of each species did not change predictably with the same variable (Fig.2, i-iv)"

**IT IS NOT ADEQUATE SIMPLY TO PRESENT THE VARIOUS TABLES AND FIGURES WITHOUT A WORD OF EXPLANATION.**

RAW DATA are usually better confined to appendices where they can be consulted if necessary by the examiner but does not impede the flow of the report. How you
decide to summarise and present the data (selectively) is an important element of the report.

**GOOD PRESENTATION IS ESSENTIAL.** In particular, always consider what the most effective way is to process and present your results. For example, if comparing two sets of closely related data, might a percentage difference table or comparative histogram be the best way of informing the reader of the outcome of the exercise?

Comment on the accuracy, precision and reliability of the data where possible. When presenting processed data, NEVER exceed the resolution of the equipment or technique. For example, if the smallest division on your measuring device is 0.01 units, it is total nonsense to quote a measurement of, for example, 1.4263 units. Remember also to think about the number of significant figures in your answer. The example above is quoted to 5 significant figures! Use your judgement but, generally, if you quote answers to more than 3 sig. fig., you must JUSTIFY this and preferably use statistical indices such as Standard Deviation or Standard Error (often not possible in class exercises).

All tables and figures should be numbered (e.g. Table 6, Figure 5) and should be accompanied by a brief but explanatory title. Tables should include clear and concise headings to columns and rows, and correct units at tops of columns. Figures need to have detailed explanation in the Figure Legend. Each Table or Figure should be comprehensible without reference to the text. Generally do not present the same data in more than one form (table, graph, pie chart, etc). Note that Figures come in multiple forms, including sketches, photos, images, graphs, and others – but all are referred to as Figures.

It is important to label clearly yet concisely the axes of graphs, and to include the units. Plot points PRECISELY and PROMINENTLY: use an X to mark the point precisely, surrounded with an O to make it prominent. Check your accuracy too – marks are easily lost through careless errors made when plotting graphs. Very often, the principles or hypotheses delineated in the Introduction predict a certain shape for the graph, for example: straight line, curvilinear, sigmoidal, hyperbolic, exponential, etc. Bear this in mind when fitting a line to the data points. DO NOT DRAW THE LINE BEYOND THE OBTAINED RESULTS. If extrapolation is necessary, then indicate this using a broken line. In some cases, it is more appropriate to simply draw a line between the data points.

As large a scale as convenient should be used when creating graphs, so that the resolution of the graph is high. Do not squash your graph into one corner of your graph paper; think about the range needed for each of the axes. Many graphs do not need to have axes staring at zero! But also use sensible divisions on your axes, to enable ease of plotting and reading from the graphs. Give your graph a meaningful title too: this will not be “graph of y versus x” but rather should explain the type of comparison that is being made. The title of the graph should not be written on it, but should be provided as the Figure title.

Drawings should be fully labelled to indicate all important features. They need not be 'artistic' and should contain a minimum of shading or hatching. Always give an
idea of scale by calculating the actual magnification of the drawing and/or displaying a scale bar.

4. **DISCUSSION:** This section should be a discussion of **YOUR RESULTS** and should indicate not WHAT the results were but WHY you think you obtained the results you did. This is where you interpret the results you obtained. **BE CONSTRUCTIVELY CRITICAL.**

To write the discussion, refer back to the 3 sub-sections in the Introduction of the report where you should have 'set the scene'. Deal with them in reverse order:

(c) Have the aims been achieved? If not, why not?
(b) How have the principles or hypothesis or theory stood up in your particular experiment[s]? If not, why not?
and (a) How do these observations fit in with and/or add to the background knowledge?

Bring key points to the attention of the reader by quoting particular data from the tables and figures to back up your statements and comments. **AVOID SENTENCES SUCH AS: "As can be seen from the results, the experiment proves..."**

BRIEFLY, draw attention to sources of error and propose how these might have been avoided. Suggest improvements to the given experimental design. Be critical of your results but do not be scathing (unless you know of a good reason!). Remember that very often this is the first time you will have used a particular technique, so it is not surprising that you are not yet master of it.

Some academics will have set specific questions that they wish you to address. If that is the case, do ensure you include your answers to those questions, within your Discussion.

5. **CONCLUSIONS:** You should be aware that to be sure of the validity/significance of your results, you MUST do the experiment SEVERAL TIMES - a feat not generally possible in class practicals but a goal you should strive for in final year project work. Hence, beware of being categorical in your conclusions that your results “prove” a certain hypothesis or that they negate the work of eminent scientists who have worked on the problem for years. If unexpected results are obtained, think about possible alternative explanations and assess their likelihood.

6. **REFERENCES:** The books (and research papers) used as sources for your report should appear as a list at the end of your report. Please refer to previous sections of these guidelines, and the SBS Citing and Referencing Guide, for details of listing of sources.

8.3 **General points about practical write-ups**

1. The Results and Discussion sections are the most important part of practical reports. Lack of effort and/or bad presentation here will lose you a lot of marks, generally. Therefore, do not waste time copying out methods unless it is necessary. Ensure you follow the guidelines and requirements specified for that practical – not...
all practicals require the same sort of report; many involve completion of proformas, or ask students to address particular questions. Look out for particular instructions provided for specific practicals. If there are detailed marking criteria, then do read through these to ensure you are aware of the expectations and how your work will be marked.

2. Do not be disheartened if your results are 'poor'; no reasonable person would expect you to get high quality data from one attempt at a practical exercise. In a project, this might not be so because you will have had the opportunity to practise several times. The most important point to a class practical is not how good or how poor the results are (although it does come in to some extent) but that THE RESULTS (OBSERVED OR MEASURED) ARE CORRECTLY RECORDED, ANNOTATED, PROCESSED AND CONSTRUCTIVELY CRITICIZED. The result sheets provided for some abbreviated reports should help you to learn how to do this efficiently. Apply what you learn there to other write-ups.

3. Make very explicit what material in your report is (a) your own observations, (b) pooled class results and (c) derived from other sources (which should always be acknowledged).

4. Write scientific English using your own words: DO NOT COPY OTHER STUDENTS' WORK AND DO NOT ALLOW YOUR WORK TO BE COPIED - if copying is detected, BOTH parties may be penalised. Please refer to Section 3.3 on Plagiarism for further information.

5. Unless specifically told otherwise, use S.I. units, symbols and prefixes and only accepted abbreviations and conventions (see Appendix 1). Take care with your handwriting; there is a difference in meaning between, for example, m and M; k and K. Pay particular attention to make a clear distinction between m and µ when dealing with quantities.
9 Coursework submission arrangements

9.1 Submission of projects/essays/laboratory reports

Students are told in individual courses/tutorials when and where reports, essays or other material for assessment are to be handed in. Most usually this will be into the locked hand-in boxes located in the Bourne Lecture Theatre tunnel. Final year Projects will be handed in to the School Teaching Office and a receipt obtained. Some proformas may be submitted at the end of the practical session. Increasingly, coursework may be submitted electronically.

9.2 Consequences of late submission

There is a College-wide policy on late submission of coursework for assessment.

- For work submitted up to 24 hours late, the mark will be reduced by ten percentage marks (e.g.: a mark of 65% would be reduced to 55%; a mark of 48% would be reduced to 38%).

- For work submitted more than 24 hours late, the maximum mark will be zero.

Late submission of work will therefore have a serious impact on the marks scored for a particular course unit and, for the third year project, this could result in the loss of 25% of the marks for that year. There is a clear and simple solution - hand in all your work before the deadlines.

Late coursework must be submitted directly to the Teaching Office (5-02). Late work cannot be accepted through any other route, or by any other member of staff.

9.3 Extensions to deadlines

You should make every effort to complete and hand in work by the deadline set, but if there are genuine reasons why you’re not able to do this, you can apply for an extension through the College extension request system. You will need some documentary evidence to support your reasons for needing the extension. Extensions are not automatically granted. However, individual circumstances are considered on a case-by-case basis. Please note that heavy work-load is never a reason for granting an extension.

9.4 Penalties for exceeding word length

The following is the College policy and applies to all students on taught programmes of study:

Work which is longer than the stipulated length in the assessment brief will be penalised in line with Section (13)(5) of the College’s Undergraduate Regulations 2016-17 (https://www.royalholloway.ac.uk/ecampus/academicsupport/regulations/home.aspx):
Learning to write concisely is an important transferable skill. The application of penalties for over-length work helps promote in students the discipline of writing to a pre-determined specification. The penalties also help to limit the occasions on which markers are asked to read work which exceeds the word limit to an unreasonable degree.

Section 13 (6)
Work which exceeds the upper word limit set will be penalised as follows:

(a) for work which exceeds the upper word limit by up to 10%, the mark will be reduced by ten percent of the mark initially awarded;

(b) for work which exceeds the upper word limit by more than 10% but up to 20%, the mark will be reduced by twenty percent of the mark initially awarded;

(c) for work which exceeds the upper word limit by more than 20%, the mark will be reduced by thirty percent of the mark initially awarded.

In addition to the text, the word count should include quotations and footnotes. Please note that the following are excluded from the word count: candidate number, title, course title, preliminary pages, reference list and appendices.
10 Third Year Project reports

A project is a piece of practical scientific research that you will carry out independently in your final year. The topic is normally proposed by the member of staff who will supervise it. Through gathering together the necessary background information, planning the project, carrying out the experiments or analyses, and drawing your own objective conclusions from the data, you will gain a valuable personal appreciation of scientific research, and experience some of the rewards and frustrations. Carrying out a final year project will help you to decide whether you want to go on to do post-graduate research.

You should buy a laboratory notebook specifically for the project. Make sure at the beginning that you fully understand the scientific objectives, and write them down in your notebook. Use the notebook for making notes on papers you read, and for all other project information. Keep your notebook updated with all the experimental work you do, recording plans, observations and interpretation as you work through your project. This will be invaluable when you come to write up your project report.

You will find full instructions on the requirements, preparation and submission of your final year project report and its marking criteria in the BS3010 Handbook.
11 Examination Skills

11.1 Exam technique

Preparation

• Organise your time as the exams approach:
  ○ map out the preparation time available.
  ○ list all the tasks to be done.
  ○ prioritise tasks.
  ○ timetable tasks as if you had only half the time available. Use the remainder for overspill, or going over material a second time.
  ○ beware the perils of ‘displacement activity’ - filling time with trivial activities as a means of putting off an unpleasant job, like revising!

• Take time to look at past papers for the exams you are sitting to gain an idea of the structure of the various papers and of the type of questions that are asked. Papers for the preceding five academic years are available from Moodle. You must not however use past examination papers as a sole revision tool. ‘Question spotting’ is a dire examination strategy and you are strongly advised against this practice.

Exam writing

• First of all, don’t panic.

• Read the paper instructions very carefully:
  ○ number of questions to be answered?
  ○ time allowed?
  ○ time per question?
  ○ any questions compulsory, or prescribed number per section?
  ○ do different sections require different answer books?

• Read each question very carefully. For those you decide to tackle:
  ○ start each question on a new page of the answer book. Take note of any instructions to answer different sections of the paper in different answer books.
  ○ don’t waste time copying out the question into the answer book.
Think carefully about what the question is asking - what lies behind it?

Map out your answer in the answer book as a list of topics/headings (don’t just start writing). Do it in pencil, or cross it out if you wish.

Check the question to make sure you are really answering the points required. However erudite your answer, we cannot give you marks if it is on the wrong topic.

Write the full answer, if possible with 5 minutes to spare. Spend most time on the parts of the question that earn most marks where this is indicated.

Check the answer to ensure it fully covers what is required (as much as you can).

- A well annotated figure may be as informative as a page of writing.
- Record all calculations and workings so that in the event of a mistake some credit can be awarded.
- Don’t inflate your answer with repetition or irrelevant material. Hard information and evidence of understanding earn marks, not length.
- Citing references in exams can be a good way of demonstrating your understanding of the subject through outside reading. However, citing only author and year (e.g., Cox et al., 2009) is generally insufficient for the examiners to ascertain the appropriateness of the information; a full reference is required. However, most examiners would rather you learnt and understood the concepts, and included additional information as factual details that go beyond the material taught, rather than trying to memorise a list of citations and references!

- At the end of the exam, ensure your Candidate Number is correctly entered on each answer book, and tie answer books, graphs etc. together.

Refer to Appendix 4 for additional information, and look in the Tutorial Handbook for examples of good and not so good examination answers, which will be discussed during a Tutorial.

12 Transferable Skills

Together with learning considerable detail of many aspects of biosciences and related subjects, your degree programme will also teach you a range of what are known as “transferable skills”, e.g. team-working, communication skills, computer literacy, numeracy etc. The particular skills in each BS course are shown in Appendices 6-8.

13 Preparing a curriculum vitae (‘CV’)

It is very useful to prepare a CV in your second year and to update it regularly. A personnel
manager commonly faces tens or even hundreds of applications for a single job, so at the first short-listing stage he or she may spend only a minute or two looking at your CV or form. It must therefore be concise, informative, carefully prioritised and neatly laid out if it is to succeed in getting your name on the short list.

Use a PC for drafting your CV, refining it in the light of your Personal Tutor’s comments, updating it to include recent experience, and print a high-quality copy to create a positive initial impression. Include name, home and term-time addresses with phone numbers if available, A-level or other entry information, your degree programme with dates, courses taken and results achieved, plus activities or interests in which you have excelled, shown initiative or borne responsibility, and the names of two academic referees.

Confine yourself to established facts. Leave it to your academic referees to predict the class of degree you may get.

Acknowledgments

These guidelines have been produced using similar documents from the Department of Earth Sciences, Royal Holloway and the School of Natural and Environmental Sciences, Coventry University. Their permission to use their documents is gratefully acknowledged.
Complete the relevant table to provide a permanent record of the skills you have acquired during your degree programme. The skills taught in each course unit can be found in Appendices 6-8.

**RECORD OF GENERAL CAPABILITIES AND SPECIFIC SKILLS**
**ORGANISMAL BIOSCIENCES**

Acquired by: .......................................................... (insert name)

<table>
<thead>
<tr>
<th>Capability</th>
<th>FIRST YEAR</th>
<th>SECOND YEAR</th>
<th>THIRD YEAR</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Capability in organismal bioscience (know main groups of plants/animals, principles etc)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Capability in Field Laboratory Skills</td>
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<td></td>
</tr>
<tr>
<td>Skill: drawing</td>
<td></td>
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<tr>
<td>Skill: microscope use</td>
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<tr>
<td>Skill: identification</td>
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<tr>
<td>Skill: equipment handling</td>
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<tr>
<td>Skill: safety appreciation</td>
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<tr>
<td>Skill: sampling</td>
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<tr>
<td>Skill: handling animals, plants or materials</td>
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<tr>
<td>Skill: organising workbook</td>
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<tr>
<td>Other</td>
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<tr>
<td>3. Capability in Leadership &amp; Teamwork (working in groups to achieve a defined objective)</td>
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<tr>
<td>4. Capability in Written Communication Skills</td>
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<tr>
<td>5. Capability in Oral Communication Skills (delivering talks, seminars etc)</td>
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<tr>
<td>6. Capability in Conceptualisation &amp; Problem Solving (design of experiments and fieldwork protocols, sampling, application of statistical tests, making data tables, graph plotting)</td>
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<tr>
<td>7. Capability in Numeracy (calculations, statistical manipulation, data handling)</td>
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<tr>
<td>8. Capability in Technology</td>
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<tr>
<td>Skill: word processing</td>
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<tr>
<td>Skill: database management</td>
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<tr>
<td>Skill: spreadsheets</td>
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<tr>
<td>Skill: graphics</td>
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<tr>
<td>Skill: use of statistics package</td>
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<tr>
<td>Skill: use of email &amp; Internet</td>
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<tr>
<td>9. Capability in Literacy &amp; Bibliographical Skills</td>
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<tr>
<td>Skill: finding literature (inc. use of Web of Science)</td>
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<tr>
<td>Skill: organising reference lists</td>
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<tr>
<td>(essays; produced reports; dissertation)</td>
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<tr>
<td>10. Creativity and Innovation</td>
<td></td>
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</table>

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Complete the relevant table to provide a permanent record of the skills you have acquired during your degree programme. The skills taught in each course unit can be found in Appendices 6-8.

**RECORD OF GENERAL CAPABILITIES AND SPECIFIC SKILLS**

**MOLECULAR BIOSCIENCES**

**Acquired by:** ................................. (insert name)

<table>
<thead>
<tr>
<th>Indicate where practice gained or course number</th>
<th>FIRST YEAR</th>
<th>SECOND YEAR</th>
<th>THIRD YEAR</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Capability in Molecular Bioscience</strong></td>
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<tr>
<td>Understanding principles of: protein structure/function</td>
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<td>Understanding principles of: enzymology</td>
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<td>Understanding principles of: metabolic regulation</td>
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<tr>
<td>Understanding principles of: molecular biology</td>
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<tr>
<td>Understanding principles of: bioenergetics</td>
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<td>Understanding principles of: signal transduction</td>
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<td>Understanding principles of: immunology</td>
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<tr>
<td><strong>2. Capability in Laboratory skills</strong></td>
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<tr>
<td>Skill: protein separation</td>
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<td>Skill: spectroscopy</td>
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<td>Skill: use of tissues in biochemical analysis</td>
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<tr>
<td>Skill: centrifugation</td>
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<td>Skill: nucleic acid separation and manipulation</td>
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<td>Skill: microbiological techniques</td>
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<td>Skill: immunological analyses</td>
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<td>Skill: microscopy</td>
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<td>Skill: equipment handling</td>
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<td>Skill: sampling</td>
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<tr>
<td>Skill: handling biochemical materials</td>
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<td>Skill: organising laboratory notebook</td>
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<td><strong>3. Capability in Leadership &amp; Teamwork (working in groups to achieve a defined objective)</strong></td>
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<td><strong>6. Capability in Conceptualisation &amp; Problem Solving</strong></td>
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<td><strong>7. Capability in Numeracy</strong></td>
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<td><strong>8. Capability in Information Technology</strong></td>
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<tr>
<td>Skill: word processing</td>
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<td>Skill: finding literature (inc. use of Web of Science)</td>
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<tr>
<td>Skill: organising reference lists</td>
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<tr>
<td><strong>10. Creativity and Innovation</strong></td>
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</tbody>
</table>

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Study Skills in the Biosciences
## Appendix 1: Standard International Units

### Basic SI units

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Unit</th>
<th>Physical Quantity</th>
<th>Definition/equivalent units</th>
</tr>
</thead>
<tbody>
<tr>
<td>m</td>
<td>metre</td>
<td>length</td>
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</tr>
<tr>
<td>kg</td>
<td>kilogramme</td>
<td>mass</td>
<td></td>
</tr>
<tr>
<td>s</td>
<td>second</td>
<td>time</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>ampère</td>
<td>electric current</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>kelvin</td>
<td>temperature</td>
<td></td>
</tr>
<tr>
<td>mol</td>
<td>mole</td>
<td>amount of substance</td>
<td></td>
</tr>
<tr>
<td>rad</td>
<td>radian</td>
<td>angle</td>
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</tr>
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</table>

### Derived SI units

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Unit</th>
<th>Physical Quantity</th>
<th>Definition/equivalent units</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>joule</td>
<td>energy, work</td>
<td>kg m² s⁻² *</td>
</tr>
<tr>
<td>N</td>
<td>newton</td>
<td>force</td>
<td>kg m s⁻² = J m⁻¹</td>
</tr>
<tr>
<td>Pa</td>
<td>pascal</td>
<td>pressure</td>
<td>kg m⁻¹ s² = N m²</td>
</tr>
<tr>
<td>W</td>
<td>watt</td>
<td>power</td>
<td>kg m² s⁻³ = J s⁻¹</td>
</tr>
<tr>
<td>C</td>
<td>coulomb</td>
<td>electric charge</td>
<td>A s</td>
</tr>
<tr>
<td>V</td>
<td>volt</td>
<td>electric potential (voltage)</td>
<td>kg m² s⁻³ A⁻¹ = W A⁻¹</td>
</tr>
<tr>
<td>Ω</td>
<td>ohm</td>
<td>electric resistance</td>
<td>kg m² s⁻³ A⁻² = V A⁻¹</td>
</tr>
<tr>
<td>Wb</td>
<td>weber</td>
<td>magnetic flux</td>
<td>kg m² s⁻² A⁻¹ = V s</td>
</tr>
<tr>
<td>T</td>
<td>tesla</td>
<td>magnetic flux density</td>
<td>kg m² s⁻² A⁻¹ = Wb m⁻²</td>
</tr>
<tr>
<td>H</td>
<td>hertz</td>
<td>inductance</td>
<td>kg m² s⁻² A⁻² = V s A⁻¹</td>
</tr>
<tr>
<td>Hz</td>
<td></td>
<td>frequency</td>
<td>Hz = s⁻¹</td>
</tr>
<tr>
<td>Gy</td>
<td>gray</td>
<td>radiation dose</td>
<td></td>
</tr>
<tr>
<td>Sv</td>
<td>sievert</td>
<td>biologically equivalent radiation dose</td>
<td></td>
</tr>
</tbody>
</table>

### Commonly used non-SI units and abbreviations

| %      | percentage by mass | 100 mass / total mass | mass fraction ('concentration') |
| Å      | Ångstrom unit       | atomic size, crystal spacing | 0.1nm = 10⁻¹⁰m                   |
| ml     | millilitre          | volume (of solution)    | cm³ = 10⁻⁶ m³                    |
| ppm    | parts per million   | concentration           | µg g⁻¹                          |
| ppb    | parts per billion   | concentration           | ng g⁻¹                          |

### Prefixes for SI units

<table>
<thead>
<tr>
<th>Smaller</th>
<th>Larger</th>
</tr>
</thead>
<tbody>
<tr>
<td>symbol</td>
<td>prefix</td>
</tr>
<tr>
<td>m</td>
<td>milli-</td>
</tr>
<tr>
<td>µ</td>
<td>micro-</td>
</tr>
<tr>
<td>n</td>
<td>nano-</td>
</tr>
<tr>
<td>p</td>
<td>pico-</td>
</tr>
</tbody>
</table>

do not confuse ‘m’ with ‘M’. 1 ma is a thousandth of a year (~ 9 hours); 1 Ma is a million years

* The SI system prefers the notation m s⁻² to m / s²
Note that SI abbreviations are always used in the singular form (no ‘s’; e.g. 25 pascals = 25 Pa. not 25 Pas)
# Appendix 2: Greek Alphabet

<table>
<thead>
<tr>
<th>Greek</th>
<th>Latin</th>
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<tbody>
<tr>
<td>αα</td>
<td>alpha</td>
</tr>
<tr>
<td>ββ</td>
<td>beta</td>
</tr>
<tr>
<td>γγ</td>
<td>gamma</td>
</tr>
<tr>
<td>δδ</td>
<td>delta</td>
</tr>
<tr>
<td>εε</td>
<td>epsilon</td>
</tr>
<tr>
<td>ζζ</td>
<td>zeta</td>
</tr>
<tr>
<td>ηη</td>
<td>eta</td>
</tr>
<tr>
<td>θθ</td>
<td>theta</td>
</tr>
<tr>
<td>ιι</td>
<td>iota</td>
</tr>
<tr>
<td>κκ</td>
<td>kappa</td>
</tr>
<tr>
<td>λλ</td>
<td>lamda</td>
</tr>
<tr>
<td>μμ</td>
<td>mu</td>
</tr>
<tr>
<td>νν</td>
<td>nu</td>
</tr>
<tr>
<td>ξξ</td>
<td>xi</td>
</tr>
<tr>
<td>οο</td>
<td>omicron</td>
</tr>
<tr>
<td>ππ</td>
<td>pi</td>
</tr>
<tr>
<td>ρρ</td>
<td>rho</td>
</tr>
<tr>
<td>σσ</td>
<td>sigma</td>
</tr>
<tr>
<td>ττ</td>
<td>tau</td>
</tr>
<tr>
<td>υυ</td>
<td>upsilon</td>
</tr>
<tr>
<td>ϕφ</td>
<td>phi</td>
</tr>
<tr>
<td>χχ</td>
<td>chi</td>
</tr>
<tr>
<td>ψψ</td>
<td>psi</td>
</tr>
<tr>
<td>ωω</td>
<td>omega</td>
</tr>
</tbody>
</table>

The greek alphabet can be accessed in Word using the Symbol font.
Appendix 3: Tables and Figures

Fig 1: Typical table of results: Essential Features

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Volume</th>
<th>Protein conc</th>
<th>Enzyme activity</th>
<th>Specific activity</th>
<th>Total activity</th>
<th>% age recovery</th>
<th>Extent of purification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Extract</td>
<td>200</td>
<td>2.50</td>
<td>100</td>
<td>40</td>
<td>20000</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>(NH₄)₂SO₄ precipitation</td>
<td>80</td>
<td>1.25</td>
<td>200</td>
<td>160</td>
<td>16000</td>
<td>80</td>
<td>4</td>
</tr>
</tbody>
</table>

Table X: Purification of alcohol dehydrogenase

NOTE THAT THIS TABLE CONTAINS BOTH “RAW” AND “PROCESSED” RESULTS.

Fig 2: Typical Figure: Essential Features

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Appendix 4: How to do badly in your exams

Doing really badly in examinations is not an easy thing. Firstly, good preparation is required. An excellent way to do this is to fail to turn up to lectures. However, don’t get landed with a Formal Warning even before you reach the exam period. Anybody can do that; the professional failure misses just enough key lectures to ensure bad exam performance. However, it is possible to attend all the lectures on a course and still do badly in the examination if you follow these easy rules:

1. **Do no revision.** Good preparation for failure starts with minimal revision. Make sure you do not plan your revision – do it in a haphazard way, often just the night before the exam or (even better) the morning of the paper.

2. **Don’t read the instructions on the front of the paper.** This is especially important for MCQ papers. It is very easy to do badly, even if you know all the answers, by filling in the answer paper incorrectly. With a normal written paper, not reading the instructions will ensure that you answer the wrong number of questions.

3. **Answer the questions in number order.** Examiners are sneaky – they don’t tell you that you can answer the questions in whatever order you like. Successful students will answer them in their own order of preference, so if you want to do badly, answer them in the order they appear in the paper.

4. **Take no notice of the format asked in each question.** So if a question asks for “answer the following in a few sentences or diagrams” make sure you either give a one word answer or write a whole page.

5. **Don’t read through all the questions before you start writing.** Why read through and know exactly what they are asking? If you really want to do badly, don’t read them at all. Be careful, very often there are clues in the question and you don’t want to read these and end up writing the right thing.

6. **Don’t plan your answer.** Remember examiners are looking not just for factual accuracy but also the ability to correctly structure an essay. So, write down the first things that enter your head in a jumbled order and that should ensure a nice low mark.

7. **Don’t answer the question.** Make sure that you write about something else, other than the subject asked for. Put in lots of irrelevant facts. However, if you choose this method of doing badly, your answer will not stand out from the crowd – this is by far the most common method used by students who do badly in their exams.

8. **Don’t state the obvious.** Assume the examiner knows everything and so do not put down what may seem to you the most obvious facts. Don’t write what anybody might know – that’s an easy way to get a few marks, which is what you are trying to avoid!
9. **Waffle.** Waffling is an Art form. Practice it, and it is very easy to become a splendid waffler. Make sure you write everything in a very long-winded way. Take three sentences to describe a point when successful students would only use one. An excellent way to waste time and lose marks.

10. **Take too much time on certain parts of a question.** Points (6) and (9) above will help you to do this. A good way to do badly is to spend so much time answering one part of a question that you don’t have time to get easy marks elsewhere.

11. **Don’t put in any examples or reference to the literature.** Make sure you make the answer nice and boring. Don’t let the examiner think you have any interest in Biology or have ever read a book, let alone a scientific manuscript.

12. **Don’t answer the right number of questions.** If it asks for three, answer two. Writing far too much irrelevant material will ensure that this is not a problem for you. It can be the case that a lot of marks for a question are obtained quite early on in the answer, so don’t go and ruin all your earlier hard work by answering the start of the last question then getting enough marks to pass!

13. **Don’t put in any diagrams or graphs.** Remember “a picture paints a thousand words”, so use the thousand words to waste time rather than taking the easy way out by drawing the picture.

14. **Write illegibly.** Examiners like to be able to decipher scripts reasonably quickly, so you should fail to get lots of marks if the examiner cannot read your writing.

15. **If running out of time, don’t put down a list of the main points.** Why let the examiner know that you knew the answer, and get a few easy marks. Let them think you know nothing!

And for numerical questions:

16. **Don’t answer any of the written parts.** Usually, it is easy to pick up marks on these, don’t give your confidence a boost by answering them.

17. **Don’t check any calculations.** It is a fact that if you add up columns and rows of figures, they won’t balance the first time. So why worry? Assume the examiner won’t check them either!

18. **Set out all calculations in intricate detail.** Plenty of time can be wasted by, for example, solving every small piece of a large equation in several steps. Alternatively…

19. **Don’t put down any calculations at all.** Do it all on your calculator or in your head and just write down the answer at the end. What a good way to save paper and lose marks!

**Remember, examiners want you to pass, so outwit them by following these simple rules!**
Appendix 5: Useful tips on preparation of slides and powerpoint presentations

**Understand the media:** Well-designed graphics can greatly hasten and increase understanding and improve retention of information. Electronic presentations have great promise for utilizing graphics but some important potential pitfalls to consider. Well-designed presentations use consistent format, wisely chosen colours and type fonts. Poor choices not only communicate poorly but also can distract from your message and you.

**Simplify general composition:** Keep content simple and short. Use key words instead of complete sentences. Text on each slide should reflect the main points of your presentation. Bulleted items can introduce or summarize key points. Text should not recite verbatim what you plan to say. Plan on spending 2-5 minutes or less verbally presenting the content of each slide.

**Don't squeeze too much information on the page:** Five to seven words per line and five to seven lines per page is a good starting place. 25 words per page is a good guideline. Headers should be short. Spread your information over multiple "slides" rather than crowding words and graphics on a single slide. Since no two data projectors reproduce images the same you must leave at least a 10% blank or "safe area" around your text and pictures.

**Organize a basic presentation outline:**
- A. Presenter name, topic, class, etc.
- B. Objectives so audience knows where you are taking them
- C. Body of material
- D. Repeat list of objectives for group review
- E. Summary of required action or assignments

**Limit colours and control contrast:** Colour can be a powerful visual tool. Use it sparingly. Avoid large areas of heavily saturated (over 80%) colours like red or orange since they are difficult to reproduce electronically. Ensure adequate contrast between text colour and background colour. Use light letters, like white or pale yellow against a dark-coloured background like blue or green. Use only a few colour choice "templates" per presentation. What you see on your computer screen may not be what you see on the actual presentation equipment. Highly textured, multi-colour fills and loud backgrounds can be distracting. Avoid white backgrounds, which can strain viewer's eyes in a darkened room.

**Select a typeface appropriate for electronic media:** Typeface style in instructional visuals can promote visual variety, increase learner understanding and gain or engage learner attention. Fonts should enhance the presentation without being the focus. There is a good deal of disagreement about what are the best type fonts for electronic media. The most legible fonts are those that have strokes with the similar thickness at all points. Century Gothic is a good example. Faces such as Times with very thin strokes do not work well. Fancy or ornate typefaces can be hard to read and reproduce poorly on video. Save them sparingly for title slides and headings. Use normal, bold, or extra bold (black) versions of the same typeface to visually separate elements. Limit typefaces, sizes and weights to 2 or 3 and retain these throughout the presentation.
Some kinds of typeface are specifically designed for electronic presentation like Microsoft's Trebuchet MS (TrueType) and Verdana (TrueType).

Some typefaces which work well for electronic presentation include Avenir, Arial, Bookman, Old Style, Chicago, Comic Sans, Geneva, Helvetica, Lubalin Graph, Avant, Monaco, Newtext, Korrina, Optima.

**Font or Typeface Size:** Start the main body of your text at a 36pt typeface and adjust up or down from there. Test your font sizes to make sure people in the back or sides of the room can easily read your text. Differentiate headings from the main body by using larger type or a different font. Use standard upper and lower case letters for best readability.

**Keep Transitions Between Slides Smooth:** Be consistent from slide to slide. Subtle transitions work better. Fancy transitions attract too much attention away from your message and require lots of computer processing power. Simple transitions use less computer memory and won't slow the pace of your presentation.

**Clip Art, Pictures, Graphs and Diagrams:** Always attempt to substitute pictures, tables, or charts for words as they can convey complicated information quickly and efficiently. Keep drawings simple and lines bold. Make line size at least 4 pt. Solid fills work best. Stay away from screened fills, patterns and broken or thin lines which can cause annoying screen flicker. Use light, bright colours for illustrated graphics and dark backgrounds.

Always label charts and diagrams with horizontal text to avoid audience fatigue. Don't clutter graphs with text and footnotes. Reserve detailed data for handouts. Put footnotes in small text in the lower left-hand corner. If you are unsure about copyright clearance get permission or find an alternative image.

**Scan Images for Best Resolution:** Optimal settings for digitized photos, slides and printed materials is 72 dots per inch resolution and a colour palette between 256 and 1000 colours. Anything greater may be beyond the resolution of some data projectors and will create huge presentation files. Use a "universal" colour palette to ensure image colours remain consistent when transferred across computers. Scan images at 75% to 50% actual screen size. This will save disk space and leaves an area surrounding the image for headings, labels, etc. If you are unsure about copyright clearance get permission or find an alternative image.

**Use spread sheets and instructional software with care:** When converting computer generated graphics to a TV signal as much as 75% of the image resolution can be lost in the process. All of the above rules apply especially the need for reasonable contrast between lettering and background. Never use patterns, screens or anything with a line weight of less than 6 pixels, or severe screen flicker will occur. Many software programs can be enhanced for TV viewing by increasing line weights, converting backgrounds from white to light colours, increasing font size and using a simple bold typeface.

**Choose appropriate printed visuals and transparencies:** Materials shaped in TV's
horizontal format of 3 units high by 4 units wide work best. A 21 x 28cm paper is close enough to this size. Graphics for TV should be created in the horizontal (landscape) format rather than the vertical (portrait) format. Using a consistent size for all graphics eliminates the need to continually zoom the graphics camera in and out when dealing with different sizes of paper.

Use pastel or light-coloured paper (light blue or light green, for example) to avoid extreme contrast between the letters and the paper. This should make the graphics more "viewable" by both the camera and the participants. White paper with dark letters will fatigue the eyes.

**Hand lettered visuals can still work:** For hand lettering, see the notes above and print legibly with a medium point, dark coloured felt-tip marker on light-coloured paper. Pre-printed lined paper with 2cm spacing can be used to help guide penmanship.

**And finally, to prevent embarrassment:** Double check spelling, grammar and numbers. Assume there will be technical problems to work out. Arrive early enough at the presentation room to test all visuals and equipment. If you're using nonstandard fonts bring along copies or embed (save) them in your presentation. Always bring printed copies of your visuals for backup if all else fails.

REMEMBER, the most important thing is the substance of your talk, that you communicate this clearly and succinctly and show a good understanding of the material. Visual aids are just tools, albeit very important ones, to help you do this.
## Appendix 6: Transferable skills, Year 1 biosciences courses

Skills taught/practised (X) and assessed (A)

<table>
<thead>
<tr>
<th>Course number</th>
<th>BS1030</th>
<th>BS1040</th>
<th>BS1050</th>
<th>BS1060</th>
<th>BS1070</th>
<th>BS1090</th>
<th>Tutorial</th>
</tr>
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<tbody>
<tr>
<td>1. Capability in Biology (know main groups of plants/animals, principles etc)</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Capability in Field or Laboratory Skills</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Skill: drawing</td>
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<td>Skill: microscope use</td>
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<td>X</td>
<td>X</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill: identification</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill: equipment handling</td>
<td>A</td>
<td>X</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill: safety appreciation</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Skill: sampling</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill: handling animals, plants or materials</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>A</td>
<td>X</td>
<td>A</td>
<td></td>
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<tr>
<td>Skill: organising workbook</td>
<td></td>
<td></td>
<td>A</td>
<td>A</td>
<td>A</td>
<td></td>
<td>X</td>
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<tr>
<td>Chemical structure drawing, chemical nomenclature</td>
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<td></td>
<td></td>
<td>A</td>
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</tr>
<tr>
<td>3. Capability in Leadership &amp; Teamwork (working in groups to achieve a defined objective)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>4. Capability in Written Communication Skills (essays, reports, poster presentations etc)</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>X</td>
</tr>
<tr>
<td>5. Capability in Oral Communication Skills (delivering talks, seminars etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6. Capability in Conceptualisation &amp; Problem Solving (design of experiments and fieldwork protocols, sampling, application of statistical tests, making data tables)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>7. Capability in Numeracy (calculations, statistical manipulation, data handling)</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>X</td>
</tr>
<tr>
<td>8. Capability in Information Technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill: word processing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>A</td>
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<td>X</td>
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<tr>
<td>Skill: spreadsheets</td>
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<td></td>
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<td>A</td>
</tr>
<tr>
<td>Skill: graphics</td>
<td>X</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Capability in Library &amp; Bibliographical Skills</td>
<td></td>
<td></td>
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<tr>
<td>Skill: finding literature (incl. use of WOS)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>Skill: organising reference lists</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10. Opportunity for creativity and innovation (eg. posters, presentations, podcasts)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix 7: Transferable skills, Year 2 biosciences courses

Skills taught/practised (X) and assessed (A)

| COURSE NUMBER | BS2005 | BS2010 | BS2020 | BS2040 | BS2050 | BS2070 | BS2090 | BS2110 | BS2120 | BS2140 | BS2150 | BS2160 | BS2170 | BS2180 | BS2190 | BS2200 | BS2210 | BS2220 | BS2230 | BS2240 | BS2250 | BS2260 | BS2270 | Tutorials |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1. Capability in Biology (knowledge base specific to course) | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| 2. Capability in Field or Laboratory Skills | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Skill: drawing | A | A | X | | | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| Skill: microscope use | A | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Skill: identification | A | X | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| Skill: equipment handling | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Skill: safety appreciation | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Skill: sampling | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Skill: handling animals, plants or materials | A | A | X | A | X | A | A | A | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Skill: organising workbook | A | A | X | X | X | A | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 3. Capability in Leadership & Teamwork (working in groups to achieve a defined objective) | A | X | X | X | X | A | A | X | X | A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 4. Capability in Written Communication Skills (essays, reports, poster presentations etc) | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| 5. Capability in Oral Communication Skills (delivering talks, seminars etc) | A | A | | | | | | | | | | | | | | | | | | | | | | | | | | |

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Study Skills in the Biosciences
<table>
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<tr>
<th>COURSE NUMBER</th>
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<th>BS2010</th>
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<th>BS2070</th>
<th>BS2110</th>
<th>BS2120</th>
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<th>BS2160</th>
<th>BS2001X</th>
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<th>BS2220</th>
<th>BS2540</th>
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<th>BS2560</th>
<th>BS2570</th>
<th>Tutorials</th>
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<tbody>
<tr>
<td><strong>6.</strong> Capability in Conceptualisation &amp; Problem Solving (design of experiments and fieldwork protocols, sampling, application of statistical tests, making data tables)</td>
<td>A</td>
<td>X</td>
<td>A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>A</td>
<td>A</td>
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<td>A</td>
</tr>
<tr>
<td><strong>7.</strong> Capability in Numeracy (calculations, statistical manipulation, data handling)</td>
<td>A</td>
<td>A</td>
<td>X</td>
<td>A</td>
<td>X</td>
<td>A</td>
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<tr>
<td><strong>8.</strong> Capability in Information Technology</td>
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<td><strong>10.</strong> Opportunity for creativity and innovation (eg. posters, presentations, podcasts)</td>
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Study Skills in the Biosciences
### Appendix 8: Transferable skills, Year 3 biosciences courses

Skills taught/practised (X) and assessed (A)

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<th>BS3600</th>
<th>Tutorials</th>
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</table>

1. **Capability in Biology** (knowledge base specific to course)
   - A A A A A A A A A A A A A A A A

2. **Capability in Field or Lab Skills**
   - **Skill: drawing** X
   - **Skill: microscope use** X
   - **Skill: identification** X
   - **Skill: equipment handling** X
   - **Skill: safety appreciation** X
   - **Skill: sampling** X
   - **Skill: handling animals, plants or materials** X
   - **Skill: organising workbook** X

3. **Capability in Leadership & Teamwork** (working in groups to achieve a defined objective)
   - X A A X A A A X A

4. **Capability in Written Communication Skills** (eg. essays, reports, poster presentations etc)
   - A A A A A A A A A A A A A A A X

5. **Capability in Oral Communication Skills** (delivering talks, seminars etc)
   - A A A A A A A A A A A A A A A X
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1 Will vary depending upon the project undertake