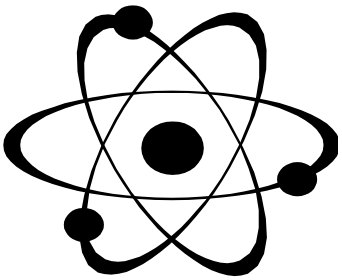
University of Sussex

# Department of Physics and Astronomy

# Guide to Study 2015/16



**Keep this booklet for future reference**

**Please note that this handbook is accurate at the time of going to print any updates will appear on the web site. University Regulations are yet to be confirmed.**

# Contents

## Introduction

We are delighted that you are coming to study for a degree in Physics or Astrophysics at the University of Sussex. This brief guide offers a few suggestions to help you with your studies. These are general pointers and help you to develop a professional working attitude. Developing such an attitude helps *you* to get the best degree you can by making you study more efficiently and avoid some of the common pitfalls. Starting now to build up good working habits will benefit you throughout your career, whereas bad habits require a real effort to change. Note that the information given in this document is very general. Therefore, when preparing your work, do not solely rely on this guide and make sure you carefully read the instructions given by your lecturer as well.

Useful items to have are:

1. An English Dictionary; although you may prefer an online dictionary.
2. Andrew Northedge, (2005), The Good Study Guide, Open University Press.
   or Andrew Northedge et al (1997), The Sciences Good Study Guide, Open University Press.
3. A diary (electronic if you prefer) to help you plan your work each week
4. A stapler
5. A hole punch if you intend to store your notes in ring binders.
6. A4 lined pad, pens, pencils, rubber and ruler
7. Ring binders
8. An approved scientific calculator namely CASIO fx-82, fx-83, fx-85, fx-991, fx-115, fx-570 (all with any suffix). These are the only calculators authorised for use in examinations.
9. You may find a style guide useful when writing reports. Strunk and White is excellent, but is geared to American English. Oxford University has a useful, compact, downloadable style guide; The Economist style guide is also recommended.

## Mastering Physics

In Year 1 modules the department makes use of an on-line software system called Mastering Physics, which complements a standard undergraduate textbook in physics: University Physics (12e), by Young & Freedman.
Mastering Physics is a web-based homework and tutorial system, and will be used in most Y1 physics modules.
The department will give you a voucher as part payment for the textbook and a software access code to all students registered on these modules. A dedicated Help Desk will be held at the beginning of the Autumn Term.

Those students now entering their second year should note that their Mastering Physics access licence is still valid should they wish to access the site for revision.

## Study skills

Developing good study skills is very important. Indeed you would not be coming to University if you had not already developed some study skills, but everyone can learn to improve the study skills that they have. It is for this reason that we recommend you buy and read "The Good Study Guide" by Northedge (2005) or Andrew Northedge et al (1997), The Sciences Good Study Guide, Open University Press.
Briefly, what are these skills?

They include the following:-

- Planning and organising your time
- Setting objectives and achieving them
- Analysing information
- Problem solving
- Asking questions
- Knowing where to find information, sources of help, advice and guidance.
- Thinking and understanding
- Reading to a purpose
- Reflecting on your experiences and learning from them.
- Communicating and presenting your ideas both orally and in the written word.
- Writing skills, especially in producing good essays and reports.
- Numerical skills
- Computing skills
- Working and communicating in groups
- Keeping an open mind
- Learning and memorising
- Being able to follow written and spoken instructions
- Taking good notes from lectures and written sources
- Decision making
- Self-motivation

The list may seem daunting, but we are not seeking immediate perfection! It is important that you enjoy the subject you have chosen to study and that you also get the most out of your time at university. Academic work as well as recreational and social activities are all essential parts of university life.

Academic work can be hard and requires an input of time and effort. So, how much work will you need to do each week? The amount of work depends upon your aptitude for the subject concerned, so some areas will require greater effort than others. **As far as possible you should aim to work a 40 hour week (as in most jobs).** There will be times in the year, however, when you will need to put in more time (eg examinations, deadlines for assignments and projects). Also some of your time should be used to discuss academic issues with your peers. You can learn a great deal from other people. Nobody has a monopoly on wisdom!

## *Textbooks and the Library*

The library is a important resource for you to use, and contains an enormous amount of information in its textbooks and journals. Attendance at appropriate sessions organised by the library staff should help you to find your way around. During these sessions the full range of electronic (e.g. Web of Knowledge, INSPEC) and other services (e.g. inter-library loans) will be described.

Each module will have recommended textbooks which it is important for you to get hold of, but the library cannot supply every book to every student. You should also consider buying your own copies, either from the **campus bookshop** (which can order books for you) or from an on-line retailer.

The following is a list of the most relevant classification marks of books and journals which can be found in the Main Library. You should make extensive use of books when researching for essays and your final year project.

| | |
|---|---|
| Science | Q, QA |
| Astronomy | QB, QC |
| Physics | QG |
| Mathematics | QD, QE |
| Chemistry | QJ |

## *Lectures*

Most physics modules have two lectures per week. We strongly advise students to attend these lectures and we keep a record of attendance. Maximum benefit is obtained from lectures by having a look at the lecture material beforehand, judicious note-taking during the lecture, and ideally writing up the notes soon after the lecture (while it is still fresh in your mind). Points which are unclear in the notes should be discussed with the lecturer, in the workshop or office hour. *You cannot learn by osmosis: Just sitting through the lecture will not help you.*

At the beginning of each module the lecturer will distribute a detailed syllabus and reading list. In some cases, there may be references to particular chapters of recommended books and an indication as to which parts of the module are to be covered by lectures and which parts by reading from books. Most booklists are available for consultation via the Library web pages.

## *Workshops and exercise classes*

First and Second year: Each physics core module has a weekly compulsory workshop period in addition to lectures. Records of attendance are kept. In a workshop, a class of typically about 40 students works on problems which have been handed out earlier for students to attempt. Workshops are supervised by the lecturer and/or selected postgraduate students. Individual queries are handled on request from one or more students, and more general problems may be the subject of a blackboard presentation by the lecturer. Modules may also be supported by a weekly exercise class, run by the lecturer, designed to give guidance in the solution of problems and to clarify material which seems to be causing general difficulty.

## *First year tutorials*

All first year students will meet regularly with their Academic Advisors in small group tutorials. Most of the emphasis in these meetings, which are mainly in terms 1 & 2, will be on general issues such as study skills, but there will normally also be opportunities to raise questions about your modules.

## *Additional teaching*

There is a drop-in **Help Desk** scheme to provide assistance for students who find they have gaps in their understanding, especially in mathematics. This is primarily aimed at foundation, first and second year students, but any Physics students may use it. Details of time and place will be published on the noticeboards outside the School Office as well as on the department web pages.

## *Feedback hours*

All module convenors run a Feedback Hour, when they will be in their offices and available to help students with problems encountered on that module. In practice, however, most faculty in Physics and Astronomy have an "open door" policy and are happy to discuss problems with you on an informal basis if time permits.

## Taking lecture notes

During your university career you will listen to many lectures. It is important that you take good notes and keep them in an orderly way (e.g. in a ring-binder) to get the most out of lectures. Note-taking is very much an individual skill that you must develop for yourself, but here are a few tips:-

- Attend all lectures to maintain continuity and coherence in the module.
- Listen carefully
- Do not try to write everything down.
- Lectures provide the framework for a module, so don't expect to get all the information you will need from lectures alone. One feature of a first class student is that she or he can demonstrate that they have read widely around the subject.
- Write down the main points and logic of the arguments presented in the lecture. Numbering and subheadings will help.
- Organise your notes in such a way that you can add to them later e.g. leave plenty of spaces in the margins or between subheadings.
- Develop your own set of abbreviations and then be consistent in using them
- Jot down specific examples given by the lecturer. You can get details later.
- Make sure you copy diagrams and graphs correctly (unless given in a handout). Label the axes of graphs with the correct units.
- Most lecturers provide handouts, which will be very useful to you when you check your notes.
- Read through your notes as soon as possible after the lecture and before you forget them. Work your way through carefully, and preferably write them up clearly so that you will understand them later.
- Highlight any points you do not understand and arrange a time with the lecturer to clarify them.

- If you come across any new terms/words, check the spelling and meaning by looking them up in an appropriate dictionary or glossary in a textbook.

## Taking notes from books and papers

Reading a scientific text is not like reading a novel. You may often need to read and then re-read scientific texts to understand them properly. Don't be disheartened by this. Everyone has to re-read certain ideas to really understand them. Make sure you have understood an idea, then take notes in your own words. Avoid just copying the text. It is essential that you write things down in your own words: Firstly because it means that you have understood the text, and secondly because you avoid the academic misconduct of plagiarism – see http://www.sussex.ac.uk/students/essentials/studenthandbook/ - which, even aside from the fact that it is dishonest, has severe penalties associated with it. Simply writing down an author's words, or copying their mathematical derivations, without acknowledging them is a serious offence. Therefore, use your own words as far as possible. Sometimes it is appropriate, even essential, to use a quote directly from a text. This is quite permissible provided (1) the text used is in quotation marks, (2) the author, date and source are cited in brackets immediately after the quotation, and (3) the source is listed among the references given at the end of your essay/report. As an aside, please make sure that you quote the author correctly!

### Writing well and avoiding academic misconduct

Plagiarism, collusion, and cheating in exams are all forms of academic misconduct which the University takes very seriously. Every year, some students commit academic misconduct unintentionally because they did not know what was expected of them. The consequences for committing academic misconduct can be severe, so it is important that you familiarise yourself with what it is and how to avoid it.

The University's S3 guide to study skills gives advice on writing well, including hints and tips on how to avoid making serious mistakes. Visit http://sussex.ac.uk/s3/writingwell and make use of the resources there. You will also find helpful guides to referencing properly and improving your critical writing skills.

If you are dealing with difficult circumstances, such as illness or bereavement, do not try to rush your work or hand in something which may be in breach of the rules. Instead you should seek confidential advice from the Student Life Centre.

The full University rules on academic misconduct are set out in the Undergraduate Examination and Assessment Handbook; which can be found on the University Web site under Student Progress and Assessment.

## Presentation of written work

A well organised and well presented piece of work is very important. Remember "You don't get a second chance at a first impression!"

Solutions to problem sets should be hand-written but legible. Essays and reports will generally have to be word-processed. In either case check your spelling and grammar before submitting the work. Most word-processing software packages

have a spell-check, but use a dictionary if uncertain. Do NOT guess! You are on the road to becoming a university graduate. As such, you will be expected to have a command of the English language, which includes correct spelling and grammar.

When presenting work, we suggest a number of "Do's and Don'ts". They are intended to help you AND to make it easier for the tutor to handle, read, and mark your work.

**Do**

- Do check spelling, grammar and page numbers.
- Do leave a one-inch left hand margin.
- Do invest in a stapler

**Do not**

- Do not hand in loose sheets
- Do not hand in unpaginated sheets.
- Do not use a paper clip or bulldog clip.
- Do not put your work in a plastic envelope or binder. It can take the tutor, with 50 or 60 pieces of work to mark, a considerable amount of time to take binders off and put them on again! Also plastic is slippery and this makes it difficult to keep essays in piles. So save your money!

## Answering Problem Sets

Problem sets are designed to test your understanding of material delivered in lectures. It is only by attempting problems that you discover which parts of the material you fully understand.

Problem sets can seem quite intimidating and often students do not know where to start. Don't panic – there will be others in the same situation as you. First, try to understand the physical principles involved – should you use conservation of mass or energy; does a moving charge create a magnetic field; etc. If you don't understand the physics then seek help. Blindly writing down equations in the hope that you will stumble upon the correct answer will not help you to learn.

Sources of help include:
lecture notes
text books
other students
physics help desk
module lecturer (after lectures, or in their office hour)
demonstrator (in a workshop)

Working together on problem sets **to establish an algorithm** is to be encouraged **but except where explicitly stated, the submission of joint work as though it were the individual's is regarded as collusion and will be reported to the Misconduct Panel.** If you don't understand the distinction, please ask. As a guideline, you should always be able to derive any work that you hand in **from scratch** without looking at any other notes. **Looking up**

**solutions online, and submitting them as though they were your own work, is a serious offence.**

You should try the problems in advance of the workshops. That way you maximise the use of the demonstrator's and lecturer's time. A lecturer will rightly feel aggrieved if you turn up at their feedback hour, having failed to ask questions during the lecture or workshop.

There is no need to prepare a top copy of problem sets unless the first attempt is illegible (cross out any mistakes neatly). If you do need to re-write then make sure that you copy all working so that the marker can follow your reasoning and give appropriate feedback.

**You should note that solutions to problem sets must be handed in on time or they will attract zero credit**.

## Laboratory work

In the Spring Term of Year 1 and the Autumn Term of Year 2 there is a physics laboratory (for non-theoretical students), which generally occupies one afternoon per week. The work is divided into three categories - Techniques, Instruments and Phenomena - and will contain short talks and demonstrations in addition to experimental work. The experiments illustrating phenomena will usually be related to a specific part of one of the modules although not always in the same term. The faculty supervision in the laboratory will provide a considerable element of tutorial-type teaching in the laboratory. At the beginning of each term a detailed set of notes will be distributed describing the laboratory for that term.

MPhys students take an Advanced Laboratory in the autumn and spring terms of Year 3. The laboratory contains a variety of more complex experiments that are expected to take several weeks each to complete. Students will work in pairs and are given considerable independence.

## Keeping a logbook

Each lab will require you to keep a lab diary or 'logbook'. This is one of the most important skills you develop in your laboratory module. A good laboratory logbook is essential when you begin to write papers or to develop oral presentations summarizing your experimental efforts.

This is meant to be a *complete* record of your work. Relying on your memory is not wise, as the human mind (if you actually remember what you did all those weeks ago) can deceive itself. Also, leave your mistakes readable. You will find that this it is helpful to remember exactly why certain approaches or thoughts were discarded. Therefore, never use scrap paper with the intention of copying the results into your logbook. If you follow the guidelines outlined below, you will be able to keep a structured readable logbook. Remember, a logbook is not only for you, but also for the people you work with (even if they are your lab partner and your instructor). It should be readable and structured for them as well.

- Number the pages in each book and number/date the books themselves.

- Make a *dated* entry for each time you work in your book. Keep daily notes on the right-hand page and use the left-hand page for diagrams, graphs and space to add comments later.
- Write in ink (diagrams can be in pencil). Never erase, white-out or remove pages. Indicate mistakes by drawing a single, neat line through the item.
- Fix all printouts (graphics, tables) into the notebook. Annotate graphics which as much information as possible.
- Identify the location of the data files or programs, if they are too big to include in your logbook.
- Note typical readings and settings, to enable you to set up again quickly on subsequent days.
- Tabulate data, make neat columns with clear headings and always note the correct units.
- Don't wait until you've finished data taking before making a visual examination of the quality of your data. Make preliminary, hand drawn plots of data, as they are required. These will probably save you time and frustration in making sure that your data are reasonable and suggestive of the behaviour you expect.
- Add all references to any notes that you make.

A logbook should at least contain the following items:

- A list of the objectives of the experiment.
- A restatement the essential physics of the experiments in your own words
- Preparatory questions – things you need to know.
- A block diagram of the experimental set-up. Take particularly good notes on any possible sources of experimental errors (dials, significant numbers on digital display, etc.).
- A list of things you have to do and the data you must obtain.
- Attempt to foresee how particular problems can be circumvented.
- All the data (also your lab partner's).
- The preliminary analysis.
- Critical evaluation of the experiment.

## Writing a short report

You will be asked to write a so-called short report. This is meant to be in the same logbook that contains the notes for this experiment. It is perfectly acceptable to word process part or all of the short report and paste it into the notebook.

The goal of a short report is to create a *summary* of the experiment, in particular its analysis, final results, conclusions and suggestions for further work. It should not contain any material that you have not used directly in the course of the experiment.

If all the data is already recorded in a legible form in the logbook, do not copy it (a waste of time and source of possible mistakes). The same holds for graphs, diagrams, comments and explanations. Do make sure all tables, figures and graphs have titles, and all graph axes are labelled and have units.

A suggestion for possible headings is as follows (note that some of the sections might be extremely short (i.e. referring to the original notes) and the exact set of headings is dependent the specific experiment you are describing):

1. Title
2. Aims of the experiment (Introduction)
3. Background physics (Review of previous work or theory)
4. Experimental set-up
5. Method & procedures
6. Data
7. Analysis technique (including error analysis)
8. Results
9. Discussion
10. Conclusion and suggestions for further work

## Writing a long report

The long report is a self-contained report on one of the experiments you will have carried out in a given lab and should be written in the usual format for scientific reports. If you never have seen such an object, go to arxiv.org, an online archive for scientific papers. Articles vary (in quality and length), but the organisation is generally the same (don't worry about understanding the content), although the exact headings might vary:

- Abstract
  Very briefly state the work done, the context and the central conclusions.
- Introduction
  Fairly brief, containing background information, objectives and states how the paper is organized.
- Background
  Review of previous work or (historical) context of the experiment. This section develops the theory you need to compare with your findings.
- Procedure
  What was done and how. Include a diagram (not a photo) of the set-up used. Any formulae for the procedure should be included here.
- Results
  This should contain all the important results (graphs are generally better than tables) and estimate of any uncertainties.
- Discussion
  Very important section. Here you explain your results and put them in the context of the theory and, if applicable, other work. Do they agree? If not, can you account for any discrepancies or did you find something new?
- Conclusion
  Brief statement of the successfulness of the experiment and its central results.
- Appendices
- References and footnotes
  This is the unique list of all sources used. Every item has a number or key that is used in the main text to identify the relevant reference. Also see the notes on reports below.

The English and writing style is expected to be of a good standard. Many of the guidelines that will be given on writing essays and writing (final year) reports in the next section also apply here.

## Writing essays

The essays that you will write in the course of your studies make an essential contribution to your education and training. Only practice makes perfect. Once again further details and advice on this subject are offered in "The Good Study Guide", but here are five steps that will help you. In all these recommendations, bear in mind that careful planning is critically important.

1. **Research**

   Think carefully about the essay title. What is required? What is the purpose and scope of the essay? If it says "compare", make sure you do. If it says "critically discuss", it normally means there is more than one interpretation, explanation or opinion of the data.

   Read several sources; do not rely on one textbook, especially if you want alternative views/opinions. Jot down notes in your own words as you go along and keep a list of the references and page numbers consulted. You then have a list of references which you can cite at the end of your essay.

2. **Planning**

   When you have done the research and made notes, make a plan of your essay. Use flow diagrams and arrows of key points if necessary. Draw up a list of headings and sub-headings in as logical a sequence as is possible. Think about including appropriate diagrams, graphs, figures, etc. Re-read the essay title and ensure you are dealing with it correctly.

3. **Drafting**

   Now write a rough copy or draft of the essay based upon the skeleton plan you produced. Use your own words as far as possible and quote correctly where necessary. DO NOT plagiarize.

   Use short, simple sentences and paragraphs. Each paragraph should normally introduce a new idea, or related set of ideas. In your introduction start by defining the purpose and scope of the essay to make it clear to the reader. This is particularly important if you have a strict limitation on words.

   Key points might be emphasised by subheadings. Long explanations or descriptions might be reduced by appropriate diagrams.

   Make sure you are keeping to the point. Omit ideas that are irrelevant. Ask 'what can be left out?' and 'what needs more emphasis?'. Good essays give specific examples to illustrate a point. See if you can find examples other than those given by your main textbook.

   If you do quote from a text, give the author and date in the text of the essay, and make sure you cite the full reference in the reference list at the end.

   Check on the proper convention and abbreviations for scientific units.

   The main part of your essay should be concerned with description and discussion of ideas. Sub-headings within the body of your essay can often make the structure clearer.

The conclusion completes the essay and it should be strongly and clearly worded. Essentially it is a summary of the essay and your main points.

Finally, your essay should include a list of references (or bibliography). It should contain the primary sources of your work, given in the conventional bibliographic form (see 'Writing Reports') starting with author(s), and their initials, then date of publication, title of article or book, volume and page numbers of journal or publishers in the case of books. DO NOT cite references that you have not read.

To summarize, your essay should normally contain five sections (i) cover sheet, (ii) introduction and purpose (iii) argument or discussion (iv) conclusions (v) references.

4. **Revising your draft**

Revising your draft is an important exercise. Consider the reader and anticipate the questions they might ask. Polish and improve the wording of the text to make issues clearer and remove any irrelevant material so that the essay properly addresses the title that was set.

5. **Final copy**

The final copy of your essay should be word-processed or neatly hand-written and read once more for spelling and grammatical errors. Ensure too that each page is numbered and a cover sheet has been attached before finally submitting. Students are required to submit all essays and projects electronically via Study Direct as well as on paper. Where electronic submission is not possible for any reason, two hard copies are required Make sure you submit by the date set by your tutor. Always meet deadlines!

**More notes on Writing essays**

The first set of notes below is intended to give you some general guidance on writing essays. The notes[1] headed Essay Marking are issued to faculty to help them to assess and mark essays, but they may also help you to see what is expected.

**Hints on writing of essays**

1. An essay is an exercise in communication, so you should check that what you have written makes grammatical sense, and that it says what you intend.

2. Essays must not be just repeats of what has been presented to you in the course lectures, but instead must show the result of significant additional study by you about the topics, using appropriate textbooks or scientific articles. You may presume that the reader knows as much about the topic as you knew when you chose it, as would another student in your year. It is your job to explain anything beyond that.

3. It should always be clear whether you are presenting an argument, or merely stating a result.

[1] Originally written by G. Barton, April 1996, D. Bailin, Jan 1997 and D.W. Palmer, Jan 1997.

4. You will need to strike a proper balance between words and equations.

5. Spelling and grammatical errors will be penalised.

6. You should aim to write simply and clearly, although this is hard. The word limit is normally between 2000-3000 words (for level 4 essays) and between 3000-4000 words (for level 5 essays), so you cannot, and should not, be verbose.

7. You will need to use books, articles and other sources (e.g. web sites) to assemble the material for your essay. If you quote directly from any source you *must* enclose inside inverted commas any word-for-word copies of sentences from textbooks or articles and state the exact reference (author, book or article title, date and publisher or journal) to the quotation. Similarly any diagram in your essay that is a photo-copy or exact hand-copy of a published diagram must also include such a reference. **Not to do so is plagiarism, and plagiarism in assessed work is a University offence,** http://www.sussex.ac.uk/students/essentials/studenthandbook/ *It is **not** sufficient to include the source in a general bibliography*. (See Section 8 of the *Handbook for Candidates.*)

8. When giving an explicit reference to a source, you should give it in the text in the form (e.g.) Jones & Smith (1996) and at the end of the essay collect all such references in alphabetical order, in the format:

Jones, A. & Smith, B., 1996. Journal title, volume number, page numbers (or book title, publisher, or article title, magazine or journal, issue, page number).

Alternatively, you can use bibliographic software such as EndNote (with Microsoft Word) or the facilities built into the scientific typesetting software LaTeX.

Make sure that you give enough information for someone else to be able to find the source. For web sites, give the URL in the form http://.....

9. You may wish to discuss your topic with other people, and you are encouraged to do this. However, the essay you submit must be your own work. Collusion in the production of assessed work is also a University offence. (See Section 8 of the *Handbook for Candidates.*)

**Essay Marking**

The essays will generally be descriptive essays, and are set with the following aims in mind:

a) to develop the ability to communicate scientific ideas clearly and concisely. To develop the ability to use scientific literature to find out about scientific topics, and to encourage wide reading.
b) to provide an opportunity for the written analysis, discussion and evaluation of the concepts and methods used in physics and astronomy.

The length of essays is normally between 2000-3000 words (for level 4 essays) and between 3000-4000 words (for level 5 essays) plus diagrams, and may use mathematical material, though lengthy derivation of standard results should be avoided, unless it is essential for the purposes of the essay. The marking scheme used is similar to that used for unseen exams and projects. The guidelines are as follows:

[85, 100]: Essay of an exceptionally high standard, showing a clear understanding of the whole subject matter, substantial independent reading, and expressed very clearly and professionally.

[70, 84]: Essay showing a firm grasp of the central issues covered, much independent reading and written in a professional style.
[60, 69]: Essay showing a good knowledge, possibly excellent in places, of much of the important material together with some independent reading, but with some omissions or misunderstandings, or some lack of clarity of expression.

[50, 59]: Essay showing a good grasp of important topics, offset by only a limited understanding or ability in places, but with significant omissions or lack of clarity.

[40, 49]: Essay showing a spread of relevant knowledge on the issues under consideration, but showing a good grasp of only a minority of the material. Some sections may cover the topics well but others will have major omissions, misunderstandings or lack of clarity.

[30, 39]: Essay of some merit for some of the issues under consideration, but showing scattered and perfunctory knowledge across the subject as a whole and/or general lack of clarity.

[15, 29]: Essay showing substantial deficiencies in the coverage of the issues under consideration and general lack of clarity.

[0, 14]: Essay showing very little understanding of any of the issues under consideration and with almost no relevant material.

## Writing Reports (e.g. final year projects)

The general rules about presentation of **essays** and structure of long reports also applies to **reports**. Sufficient time should be given to researching and planning the report before writing it. As it is a report rather than an essay, the use of clear sub-headings, and where appropriate bullet points, assume greater importance. You should pay particular attention to the numbering of figures, tables and pages. Each figure should be clearly drawn and bear a relevant, succinct caption. A table of contents of the report with specific page references is extremely useful to potential readers. If you need to include raw data, this should be given in an Appendix. The report must contain the reference sources consulted and these should be cited in the text according to the conventions of international journals.

The writing up of a **project** is a test of the student's ability to communicate scientific ideas and experimental work and/or mathematics to a fellow physicist. The dissertation should explain why the topic of the project is important, what the purpose of the project is, and how the student carried it out. It should conclude by summarising the results obtained and by commenting on their significance. If the project contains no original work, but is a review of existing literature, this

should be made clear from the outset. In all cases proper references should be given in the text together with a list of sources and a general bibliography at the end.

**Notes on project writing**

Length. This depends somewhat on the project, but 3,000 - 8,000 words will suffice in most cases. Survey reports, or reports on projects which have required extensive reviews of the literature, will usually be longer than reports of a mathematical or experimental nature. A balanced presentation is more important than the precise length, but the length must not exceed 20,000 words.

Layout. This should be as follows:
(a) Abstract
(b) Preface
(b) Table of Contents (with page numbers)
(c) Main Text
(d) Acknowledgements (with an indication of the work carried out by the student, the workshop, the supervisor or in previous similar projects)
(e) Appendices
(f) References and Bibliography.

Diagrams and short tables should be included in the text, but extensive tabular matter should be placed in Appendices, as should detailed calculations not required for the immediate understanding of the text.

References should follow the “Harvard” style and are made in the text by giving the name of the author and the year of publication in parentheses e.g. “...the large polarization (Moffat 1971a) is accounted for....” or “....Jones (1990) found that....”. In the case of more than two authors, use the form “....Budd et al (1971).....” At the end of the text, the references should be listed in alphabetical order of the first author (and chronological order for several papers by one author). All authors of a paper should be given in this listing. The style should be:

Budd W F, Jones M and Radol C, 1971 Rep Prog Phys, 31 1-70.

Moffat, P.H., 1971a Mon Not R Astr Soc, 153 401-418.

Alternatively, you can use bibliographic software such as EndNote (with Microsoft Word) or the facilities built into the scientific typesetting software LaTeX.

Books read as general background and not specifically referred to in the text should be listed in a General Bibliography, in alphabetical order of authors.

Main Text The order and titles of the sections in this will, in most cases, follow broadly the typical pattern of a substantial paper in a journal or of a DPhil thesis. **You should consult with your supervisor about the precise layout most relevant to your project.** Such a consultation will be most profitable if you present your supervisor with an initial draft list of the section headings you think

you should use. (An informal guide to writing a project report is appended to these instructions.)

Format. The paper should be A4 (297 mm x 210 mm) and the text should be typed or written legibly. If it is typed, plain paper should be used and the spacing should be double. If the report is handwritten, the text should be on paper with widely spaced lines. In both cases, only one side of the paper should be used and a 35 mm margin should be left for binding on the left hand side of the page.

Binding. The title of the Project, the candidate number, the name of the supervisor and the date should be typed on the front cover, your name should not appear in any form in the dissertation. The project should be bound in some way.

Plagiarism. Your attention is drawn to Section 8 of the Examination and Assessment Handbook for Undergraduates Students and particularly to the paragraph on plagiarism. If you directly quote the writings of other people in your dissertation, or use figures and/or tables from published sources, you must acknowledge this specifically in the text (as in the instructions for essay writing).

## Hints on making a poster

Some general information on making a poster can be found on:
http://www.sussex.ac.uk/physics/1-4-3.html
This page also contains some PowerPoint templates and examples. PowerPoint is a good, but not ideal, tool for designing a poster. However, in most cases it will do a good job, provided you do not expect too much. The people marking you are aware of this.
Some general rules are:

- Do not put too much information on. When working on the poster on a PC and having it displayed on (the full size of) a typical screen, you have to be able to read the text, The poster will be larger, but the larger the poster, the further away people will be to read it.
- The structure should be similar to a report (although the headings can be missing):
    - Introduction
    - Theory
    - Experiment
    - Results
    - Conclusions
- Before you start, divide your poster up in (clearly marked or imaginary) blocks, each with a clear topic. Only then start filling them in.

## Hints on presentations

1. General Rules

- The talks will be no more than 15 mins long (with 3 mins for questions/changeover). Practise beforehand to judge the length.
- Think about your audience: don't assume they know too much. They will enjoy it more and understand it better if the level is too low rather than

too high. Practise beforehand to get the level right. Also, this helps you to make sure you know the content of your talk inside out, so you can concentrate on the delivery.

- Don't panic – everyone else hates giving talks too, so you're all in the same boat! The audience is on your side... Practise beforehand to boost your confidence.
- Structure the talk: introduction, the body of the talk, conclusion. ("Tell them what you're going to tell them, tell them, then tell them what you've told them".) Practise beforehand to make sure it's coherent and well structured.
- Use brief notes if you want to, but do not read a prepared speech word for word. Make the delivery slow and clear. Practise beforehand to become familiar with the material.
- If you're using the latest version of PowerPoint or similar, make sure the file you make is compatible with the PC you're going to use it on. This is *your* responsibility. Check beforehand to make sure the technology works.
- Don't try to cover too much. Quality is better than quantity. Practise beforehand to find your weak spots.

- Look at your audience as much as you can: eye contact is important. Practise this beforehand, preferably out loud in front of a friend or friends. (Later, when you're more used to giving talks, you can just go through it in your head beforehand).

2. Ideas for Slides

- The title page should include your name clearly and prominently displayed. (It doesn't hurt to have it on every slide in the footer as well).
- There should be one simple "idea" per slide.
- Aim for an average of up to one slide per minute, not more. If your slides have a lot of information on them, they could take 2-3 mins each.
- Don't make the slides too detailed. Use a minimum of text, and large fonts (24 pt at least).
- Make sure everything on the slide can be read – graph axes are often illegible. If the audience can't read it, there's no point in having it there.
- Don't use too much maths, and don't stand there reading out equations!
- Graphics are preferable to text: the brain is much better at remembering images than words, so use pictures. (It's sometimes useful to have little icons in your conclusion to remind the audience of the pictures they've seen).
- Give the audience enough time to read whatever you display: there is no point in showing something and whipping it away before it has been registered.
- Fancy animations are all very well, but they waste valuable time to prepare, and they can be distracting. Keep them to a minimum.

## Examinations

Examinations are a fact of life. Fortunately, most modules also have a continuous assessment component too.

Here are a few tips for taking and revising for exams.

- Prepare and plan in advance of the known examination date.
- Plan your revision by making a timetable. Decide how many days you will need to spend on each subject.
- Read the 'Handbook for Candidates' before the Summer exam period.
- In preparation for the exam, pay attention to your health. Eat and drink properly; have sufficient sleep and take exercise.
- Prepare for the examination by reviewing past exam papers. Understand the rubric of the examination.
- When revising, work reasonable hours and break your study into periods of between 45 and 90 minutes.
- Try to work in comfortable, well ventilated and relatively quiet surroundings.
- Study your stronger and weaker subjects by turns.
- Make the learning process distinctive in some way, eg use different coloured pens as 'memory keys'.
- Make use of 'spider' diagrams to force you to interact with the information and see connections in different ways (good way of testing yourself).
- Peer group revision is an excellent way of increasing your understanding.
- Vary your pattern of revision e.g. read, review notes, think, write summary cards.
- Plan how you will use your time in the exam; include at least 10 minutes for reading the questions thoroughly.
- Do not work right up to the examination.
- Do not rely on predicting individual questions.
- Monitor your learning.

When in the exam

- Try not to panic.
- Make sure you answer the questions set rather than those that you think are there.
- Do not spend more than the allotted time on a question.
- Write succinctly and avoid waffle.
- Do not take notes into the exam or talk to other candidates during the exam as you may be disqualified.
- Although content of an answer is important, so is the organisation, logic, and clarity of material.
- Keep to the point of the question.
- Be clear and concise – padding is not required!
- Think as much about what you should leave out as what you should put in.
- Address the question as written on the paper, <u>not</u> "write all you know about ....." a topic.

### *Monitoring of work*

All physics modules contain an element of assessed work, which often counts 30% towards the total assessment for the module. The results, and any comments by lecturers, are available to academic advisors, and can be discussed with the student concerned. All students should also monitor their own work and progress through Sussex Direct.

### *Vacation work*

Students are expected to devote part of their vacations to study. Time should be divided between consolidating courses from the previous term (e.g., finishing off any non-assessed problem sheets), advance reading for the following term and (where appropriate) writing essays on core courses (see above).

### *Feedback questionnaire*

Towards the end of each lecture and laboratory module a questionnaire will be available on Sussex Direct inviting comment on that module. The purpose of this is to help the lecturer improve his/her course in future years and to give the Head of Department and the Courses Committee an overall picture of the modules as seen by the students. This feedback is reviewed by students on the Department Joint Committee.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