General Comment on the Report

"The essential aim of a scientific paper is to communicate ideas and information clearly, concisely and honestly."

One of the reasons for requiring a Report of your project is to train you to communicate results and ideas to other people in your future career. This is obviously just as important as being able to perform the measurements themselves - new knowledge has little value unless it can be told to others. Writing the report is therefore part of the project, as the practical work is incomplete until its results have been published in some form. Often, writing about the project helps you to understand what you have done.

Format

The format of the Report should be that of a published paper, which is one of the normal media of communication between scientists. The scientific paper is a form of text with its own conventions, just like any other form, such as the sonnet or the short story - the conventions enable the reader to obtain the information with maximum effectiveness.

Style

The general appearance, layout and use of English will all be taken into account in the assessment of your Report. The language of the Report should be in English prose, not notes. This implies the use of whole sentences which contain verbs and end with full stops, not commas. It should be noted that semicolons and colons are also available for punctuation, in certain circumstances. Paragraphs should be used.

“Authors who write papers in a language in which they are not completely fluent should make every effort, by consultation with colleagues fluent in the language, to present the work in acceptable form.”

The above quotation does not apply solely to overseas students! In writing the report do not use colloquial language, slang or technical jargon. A scientific paper has an international readership, for many of whom such usage is a barrier to understanding. Do not use abbreviations or symbols unless (a) they are standard in science or (b) they have been defined in the Report at their first time of use. It is often useful to insert a card in the cover of the Report listing such definitions.

The material should be presented as concisely as possible in simple, straightforward language, avoiding uncommon words or defining them (like abbreviations) at their first use. Keep the text short - do not use three words, or three syllables, where one will do; this will save typing and make the Report easier to read and understand. You can assume that you are writing for another scientist, but not one who works in the same field nor one who knows your particular apparatus.

Many books are available on technical report writing and writing scientific papers. Two which may help you are given at the end of the next section, under General References.

Length

The report should comprise a maximum of 40 pages of 12pt typewritten text double spaced - excluding the Abstract, Contents List, Acknowledgements, Tables, Figures, References and Appendices. Experience shows that wide divergence from this figure can be counterproductive and students are advised to discuss this aspect with their supervisor. Careful discrimination should be exercised when deciding what to put in the main text. Credit is given for a clear and well ordered presentation.

Specific Sectioning of the Report

1. **Title.** Make this as short as possible and specific, not vague and woolly. Write it last, after writing the report.

2. **Project Plan.** Please include the Plan at the beginning of your Report. If the project has diverged from the Plan substantially, please add another page to explain what has chaned.

4. **Abstract.** This is a single paragraph of less than 250 words which should summarise the whole Report (again, write this last). It should contain the aim, method, main results (numerical values with errors) and main conclusion.

4. **Contents.** This page is essential and should indicate clearly the pagination of sub-divisions of your report.

5. **List of Figures.** Title of each figure should be given with the page on which it may be found. Remember that, in a good paper, the reader should be able to grasp the essentials of the work from reading the figures alone - the same should be true of your Report.

6. **Introduction.** The purpose is to introduce the reader to the field of research in which the project lies. Here you should define the nature and scope of the investigation and give its background. You should show how the work fits into what has already been done and explain the aims of the work to be described. Mention the method that was used and perhaps the reasons for the choice of method. This is often done under a concluding sub-heading "Objectives".

7. **Theory.** If necessary, a separate section with enough detail to show how the results and data will need to be described or processed mathematically. In an experimental project it is unnecessary to derive theory from first principles - references to published work are sufficient when quoting the equations from which you start.

8. **(Materials and) Methods.** Enough detail should be given here so that a competent scientist could repeat your experiments. Write in the third person narrative tense e.g. 'such-and-such was done'. Use clear, schematic line diagrams of apparatus, with only such detail as the reader needs to follow the text. Diagrams (Figures) should have titles or legends attached, and should be numbered (Fig. 1, etc.). Describe the apparatus you used, if it is not standard laboratory equipment - not everyone is conversant with the operation of the Charpy-Notch edging machine in Room 16! Under this heading should be included any special methods of treating the data, eg. “graphs were plotted of log(x) vs y.” Do not mention results in this section: e.g. 'the Temperature Factor method did not work' is a result and belongs under another heading.

9. **Results**. Here the main results of the work are given in the text and as photographs, figures, graphs and tables. It is unnecessary to give each measurement; the points (with error bars) on a graph are enough, or the mean and standard deviation of a set of readings. Duplication is unnecessary - do not make a table of what is already in a graph. Figures, which include graphs and diagrams and photographs, should be numbered serially in the order they are mentioned in the text and be given titles or legends that describe them intelligibly, independently of the text if possible. Since everything depends on the results, this section

should be the clearest (and probably the shortest) in the report. Write it as objectively as possible, omitting discussion such as, 'the value of A was greater than expected, because of the zeta effect'.

10. **Discussion.** In this section you should cover

(i) the limitations of the results (errors);

(ii) the range for which the results and the conclusions drawn from them are valid and meaningful;

(iii) the limitations of the method used;

(iv) interpretation of the results;

(v) the implication of the results - significance, the agreement with other work.

“Authors should not make over-optimistic claims for the precision of their work and generality of their conclusions or the applicability of their results.”

Last Words. The reader must not be left at the end of the discussion thinking, “So what?” and it is useful to end the discussion with a summary of conclusions or a concluding sentence. Do not tail off, end as in music, with a suitable climax or at least a good chord.

11. **Future Work.** It is often said that a good piece of research opens up as many or more questions than it has set out to answer. Indicate where you think your work may lead and what further investigations could profitably be pursued.

12. **Acknowledgements.** You should acknowledge here any parts of the work that were done by others, and any substantial help you received; not only out of politeness but to fulfil University Regulations for conduct of the project examination.

13. **References.** This is not the same as a Bibliography. Here you should list only those publications that you have actually quoted in the text, not all the relevant books you may have read on the subject. References are usually given in alphabetical order of authors' names, in the following order: author, initials, year, title of book or paper, publisher of book or name of journal, volume number, first and last page numbers of the article, if appropriate:

Clark JM and Glagov S (1985) "Transmural Organization of the Arterial Media: the Lamellar Unit Revisited" Arteriosclerosis. 5 (1), pp 19-34.

Pashley DW (1985) in Modern Developments in Microscopy, ed. B. Siegel (New York: Academic Press), pp 168-74.

Ten Commandments

To conclude, here follow the “Ten Commandments of Good Writing”, as given (tongue in cheek) by Robert Day, referenced below.

(i) Each pronoun should agree with their antecedent.
(ii) Just between you and I, case is important.
(iii) A preposition is a poor word to end a sentence with.
(iv) Verbs has to agree with their subject.
(v) Don't use no double negatives.
(vi) A writer mustn't shift your point of view.
(vii) When dangling, don't use participles.
(viii) Join clauses good, like a conjunction should.
(ix) Don't write a run-on sentence it is difficult when you have to punctuate it so it makes sense when the reader reads what you wrote.
(x) About sentence fragments.