Writing a project dissertation

The dissertation is a ***critical*** review of the literature that addresses the major question, or series of question, relevant to your research topic. It is important that it conveys the current state of knowledge on the topic to the reader as clearly, concisely and convincingly as possible. You are strongly encouraged to work independently on your review, but the occasional guidance from your supervisor can often quickly put you on the correct track.

- The review aims to present an overview of the science of the topic. It should
  - provide a ***summary of previous work***
  - outline the ***current state of knowledge*** of the topic
  - highlight ***gaps*** or ***open questions*** that need to be addressed
  - summarise ***specific theoretical topics*** that will be needed in the subsequent project
  - present ***salient experimental details***, e.g. how a key instrument works, overall design of the experiment

- It is important that the review is ***easy to read***. It should "tell a story" with a clear theme or thread through the account.

- For a ***critical*** review, you are expected to show that you are able to ***think critically*** when comparing and contrasting the works and of different researchers. It does not mean that you are expected to criticise works in the refereed journals.

The Dissertation

The first recorded use of the word “dissertation” in the English language was in 1651 and was defined as “an extended written treatment of a subject.” Dissertation comes from the Latin *dissertare,* which means to debate. This implies that a dissertation not only examines a subject but will review different points of view about that subject.

The key to dissertation writing is research. There is no substitute for this. Your initial work must be to identify and retrieve the sources on your project subject. Then, you must read these sources, critically and analytically.

- A ***general survey*** of the refereed literature is often a good starting point, which can sometimes be helped by finding ***review papers*** in the field.

- This is followed by an ***in-depth survey*** of the papers ***relevant*** to your specific topic of interest. The aspects covered may include the underlying physics, observations, theory, modelling, and measurement techniques.

- Once papers are identified and read, it is important to be ***selective*** in the material that you include in your review. You should refer only to ***relevant facts*** from works that are closely related to your topic. The review is not a blow-by-blow account of the papers that you have read, but rather a ***selection of the relevant material*** that supports your assessment of the research topic.

- Resources supported by the Information Services are available to help you with literature searches. Many lead international journals in the field are available in the Physical Science Library. You are encouraged to make good use of them.

Be aware that the best references are refereed journals or reviewed books. Much web-based material, such as Wikipedia, is non-refereed and, unless confirmed from other sources, make poor references. It has been said "*90% of the web is at best not entirely correct and, at worse, substantially wrong*." Thus, it is not unreasonable to use web resources such as Wikipedia as a starting point for your research, however, you should confirm any information you wish to use from refereed or reviewed sources and reference those sources in your review.

It is essential that all sources used in the preparation of the dissertation are properly acknowledged. Guidelines on the use of references are given at the end of this document. You **can** include other people's work (e.g. a diagram) in your dissertation provided you make it quite clear where you got it from – e.g. for a figure copied from the Web the full URL should be given in the figure caption. Failure to do this is **plagiarism** which will be punished according to the Department's Plagiarism policy, the relevant section of which is repeated here:

If …. there was an intention to benefit unfairly by a student copying from a book or the web (without due reference), or by theft of work from another student, then the penalty will be a disciplinary interview with the Year Tutor, a mark of 0 for the work (with no possibility of resit) and a record placed on file. If the student is involved in a further incident of plagiarism, they will be referred to the Dean.

Scientific dissertations always contain **diagrams**. Yours must be clearly labelled and numbered (fig 1, 2 etc) and be supplied with informative captions and legends so that the reader can understand the figure without reference to the text. They can be embedded in the text or supplied separately at the end.

The Content of the Dissertation

It is difficult to give any hard-and-fast rules about what should be in a dissertation but there are some general features which should appear.

1. Firstly, every dissertation should have a separate title page that identifies the module and the title of the dissertation, the author, the degree sought and the date of submission.

2. The first section in the body of the text will be an Introduction section. This is probably the most important section. It needs to grab the attention of the reader, showing that you are clear about the purpose and objectives of your dissertation. Your Introduction can do the following

- Show that you have understood the title of your project and what you are being asked to do
- State the objectives of your dissertation i.e. what you are going to do
- Outline which aspects of the subject you are going to deal with and how

What you are going to do in the Introduction is to draw a map for the reader of a journey you will take the reader on. The Introduction will tell the reader not only the final destination, but also the route you are going to take, the mode of transport, the places you are going to visit on the way and the people you are going to meet and the things they may say.

3. The next section is the main body of the dissertation. There are several areas that this main body can include.

- Give a summary of the science behind your project
- Provide a literature review of relevant work published in the area of your project
- Summarise any key theoretical principles needed for your project
- Provide an overall summary of the experiment/simulation etc that you intend to use in your project

One of the most difficult aspects of this section is the literature review. A literature review is a search and evaluation of the available literature in your project area. However, you should note that

- it is not a descriptive list
- it is not an article by article summary
- it is not a survey of every single thing that has been written about your project area
- it must be defined by your project title

It must tell the reader what knowledge has been established and agreed upon in the area of your project and outline their strengths and weaknesses.

4. For any critical/scientific document, you need to develop a writing style that is clear and unambiguous, and in which your ideas are presented in a logical fashion.

Additional Notes

Often, a dissertation will have a word length. There are good academic reasons for having such a word length, in particular in the development of the skill writing concise, clear and rigorous documents.

Any dissertation that differs from the word limit by an excessive amount (in either direction) will attract a penalty via the assessment scheme. A definition of what constitutes an excessive amount will usually be given with the word length. For example, the dissertation in the PH35540 module carries a page length of 2500 words ±25%. In this case, a dissertation shorter than 1875 words would be excessively short and one longer that 3125 words would be excessively long. Note, you should aim for roughly the given word length and not try to get as close as possible to either of the extremes without exceeding them.

The word limit applies to the body of the text and not to the references. The amount of penalty is a matter of academic judgement and will depend on a judgement of how the quality of the report suffers from the excessive or deficient length.

The dissertation must be typed, and preferably bound.

Use of references

Basically, there are two ways in common use for referring to papers, books etc within text:

a) Using a superscript numeral in the text, and a list of references at the end in the order they are called, e.g.

'... The existence of ozone in the upper atmosphere was first proposed in 1881[1], based on the sharp cut-off below 300 nm in the solar spectrum. This hypothesis was not confirmed until thirty years later, when Fabry and Buisson[2] demonstrated the close correlation between the absorption spectrum of ozone and the solar irradiance spectrum between 230 and 340 nm…..'

Then at the end:

1. Hartley, W. N. On the absorption of solar rays by atmospheric ozone. J. Chem. Soc. 39, 111-128, 1881.
2. Fabry, C. and H. Buisson. L'absorption de l'ultraviolet par l'ozone et la limite due spectre solaire. J. Phys. Paris 3, 196-206, 1913.
3……

b) Using the name and date in the text and a list in alphabetical order at the end, e.g.

'... The existence of ozone in the upper atmosphere was first proposed in 1881 (Hartley 1881), based on the sharp cut-off below 300 nm in the solar spectrum. This hypothesis was not confirmed until thirty years later, when Fabry and Buisson (1913) demonstrated the close correlation between the absorption spectrum of ozone and the solar irradiance spectrum between 230 and 340 nm…..'

Then at the end:

Fabry, C. and H. Buisson. L'absorption de l'ultraviolet par l'ozone et la limite due spectre solaire. J. Phys. Paris 3, 196-206, 1913.
Hartley, W. N. On the absorption of solar rays by atmospheric ozone. J. Chem. Soc. 39, 111-128, 1881.
……

You should use whichever of these appeals most to you for your project report, but must be consistent – don't mix the two. You should refer to books or papers whenever you are quoting facts that are not 'general knowledge' in the field. You should also give the reference whenever you quote a constant or formula that you use.