

## FINAL YEAR PROJECT MODERATORSHIP THESES

### **Aims and Objectives**

The project provides an important opportunity for students to plan and carry out a detailed and original piece of scientific research and communicate the results. You should develop the following abilities:

1. The formulation of scientific questions, the planning of an investigation and the design of individual experiments.
2. In-depth scientific review of a subject.
3. Organisation of research including: logistics, recording, archiving, numerical analysis and presentation of data.
4. Technical expertise.
5. Interpretation and presentation of results in the form of a dissertation.

As part of your project you are required to produce a project proposal as if you were seeking funding for the work. Full details of what is expected in this plan are provided by the School of Natural Sciences Director of Teaching and Learning. Below are summary points from that document but please consult this document for further detail. The proposal will help you to develop important skills in summarising a research area, understanding your research objectives, and selling your work. Guidance on producing a proposal is given below.

A draft proposal must be submitted to your supervisor by the specified deadline. This will be returned to you, with comments, in advance of the final deadline. Your supervisor is only expected to comment on ONE DRAFT, although it is advised that you discuss the project well before producing the draft. The proposal should avail of current and relevant literature. It should be typed in Times Roman 12, 1.5 spacing. The entire proposal must not exceed 10 pages, including a properly referenced literature list and GANTT chart.

The Sophister Course Coordinator will supply comprehensive details of how your proposal should be structured and inform you of the deadlines. Some aspects of the proposal preparation will also be covered in the BO3109 Seminars, Tutorials and Workshops module. You are also expected to keep a project diary and should seek advice of your supervisor in doing this.

In addition to writing the project plan and thesis, students are also required to deliver a short talk on the progress of their project and produce a poster after the project has been completed.

### **Breakdown of Marks for Project**

The allocation of marks for the Project is as follows:

Project Plan	10%
Project Presentations	5%
Poster Day	5%
Thesis	80%

### **Role of Supervisors**

The role of supervisor includes:

- Discussing the project plan and suggesting changes if necessary.
- Advising on the appropriate materials and methods to use.
- Offering advice on sources of information for your thesis.
- Discussing problems with data collection should they arise.
- Advising on issues relating to writing up your thesis.
- Reading drafts of each chapter of your thesis.

Please remember, supervisors are there to help you. You will not lose marks if you consult them on a regular basis. You should arrange to meet with your supervisor at least once a week during term time. You should make appointments to meet with your supervisor as you cannot expect them to see you whenever you call to their office. In addition, you must allow adequate time for your supervisor to read drafts of materials given to them.

### **Planning Experiments**

Plan your experiments so that the maximum amount of significant data are obtained from the minimum amount of experimental work. Do not plan experiments which are large and cumbersome and which try to solve half a dozen problems simultaneously.

Decide on the statistical treatment of your data *before* you start the experiment. It is useless trying to make the best of a bad job at a late stage. Consult your supervisor for advice with statistical analysis and refer to the modules BO3016 Statistics and Experimental Design and BO4104 Data Analysis. You will *not* be penalised for consulting your supervisor, but you will penalise yourself if you devise inadequate experiments through lack of consultation. Do not accumulate large amounts of data in the hope that you can analyse them later. Analyse them as you go along so that subsequent experiments have a strong basis.

### **Thesis** (maximum 11,000 words)

Writing your thesis is a key part of your training as a scientist. The structure and conventions which we ask you to follow are those used in many reports for industry and by most biological science journals. The thesis must be coherently organised, clearly written and carefully proof-read. Please note that the following pages listed are not included in the official word count; the title page; abstract; declaration; acknowledgements, table of contents; and references. Below is

guidance on presentation and structure of the thesis. You will also have received guidance in thesis production in workshops.

Your thesis must be typed and *must* be handed in by the specified submission date. The deadline for submission is **absolute**.

### Format

- Text should be typed on single sides of A4 80g paper sheets, using 1.5 line spacing.
- Font should be 12 point and consistent in style.
- Margins should be 2 cm all round except the left margin which should be 2.5 cm.
- All pages must be numbered.
- Three hard unbound copies of the thesis must be submitted to the Botany Office. In addition a copy of your entire thesis should be sent by email to: botany@tcd.ie. Two of the hard copies will be retained by the Department (one for your supervisor, and one for the Departmental Office). The third copy will be available to you following the Publication of Examination Results, along with a copy of your transcript. Please ensure you retain an electronic copy which you may refer to before the viva.

The thesis should consist of:

- (1) A **title page** containing the following information: a concise and informative title for the project; your name; B.A. (Mod) Thesis 2011 (depending on the year); School of Natural Sciences, University of Dublin, Trinity College.
- (2) A **signed declaration** stating 'I (name) declare that this thesis is my own work except where stated through references or in the Acknowledgements and that it is (number) words in length'.
- (3) An **Abstract**. This is usually written at the very end, but comes at the beginning! The abstract should not exceed 250 words in length and should be a concise summary of the entire project.
- (4) **Acknowledgements**. Note, briefly, the help you received from others.
- (5) **Table of contents and list of figures** should be included, together with relevant page numbers.
- (6) **An Introduction**. This should give background to the topic, indicating its relevance and importance and should include within the text a literature review. A critical part of this section will be in the form of a literature review – a comprehensive and critical account of what has been published on a topic and is likely to be read by a research worker in that field who wants an up-to-date statement of what is known. Essentially this review involves you finding all the potentially relevant material in its primary source, i.e. the journal or book where it was first published. You should do this using abstracting journals (e.g. Biological Abstracts) and also current awareness journals such as Current Contents and Current Advances in Plant Science

(in Botany Library) and Web of Science Citation Database (<http://wos.heanet.ie>).

You need to read the major articles, abstracts of more peripheral material, and to note any parts of them which are relevant to the topic. This information then has to be collated and presented in a readable and logically structured way, citing all sources of the information.

Our intention is not that you should write a definitive, exhaustive review which could involve hundreds of references. The scope of the review will be limited by restricting it to a narrow topic related to your project. You should show that you are familiar with previous research associated with your project, assess this critically, and clearly indicate how it relates to your proposed work.

- (7) **Materials and Methods.** This should provide sufficient details to allow the work to be repeated. Where you are using already published methods, simply refer to the relevant paper(s) stating only modifications. As with all sections, sub-section headings will be useful where distinct sets of experiments or measurements were undertaken.
- (8) **Results.** Present and describe your processed data, with appropriate statistical analysis, in tables, graphs and figures with clear legends, labels and titles. These should describe, as efficiently as possible, the results that you obtained; typically as a series of graphs, histograms, tables, as appropriate. A concise text commentating on the tables and figures is essential. Think carefully about the most effective way to present your data. Avoid large uncondensed tables (these may be put in appendices). Make sure though that evidence of statistical significance is clear.
- (9) **Discussion.** This should highlight the significance of your findings in the context of other work (it should not repeat the results section) and should also note the limitations on your findings and alternative interpretations.
- (10) **References.** Any points made in the text must be supported by evidence, either your results or the published findings of others. The sources are identified by citation. This has the form of only the surname of the author(s) followed by the year of publication, nothing more, e.g. 'Graedel and Crutzen (1993) found that ...' if the authors are the subject or object. If the citation is simply to back up a statement, then the whole citation is in parenthesis, e.g. 'Acclimation has been observed in wheat (Graedel and Crutzen, 1993)'. If the number of authors exceeds two, give the name of the first and follow this with *et al.* (which means 'and others'), e.g. 'Halverson *et al.* (1993)' rather than 'Halverson, Clayton and Handelsman (1993)'. The full references for the citations are then given in the Reference list which follows the Discussion. Full references should be of the following forms, depending on the type of publication:

**Thesis:**

Lensen, G.M. (1993). *Responses of C3 and C4 species from Dutch salt marshes to atmospheric CO<sub>2</sub> enrichment*. DS thesis, Vrije Universiteit, Amsterdam. 113 pp.

**Journal Article:**

Halverson, L.J., Clayton, M.K, and Handelsman, J. (1993). Variable stability of antibiotic-resistance markers in *Bacillus cereus* UW85 in the soybean rhizosphere in the field. *Molecular Ecology* **2**, 65-78.

**Edited book containing a series of articles by different authors:**

Lewis, R.L. (1992). Satellite ocean colour observations of global biogeochemical cycles. In: Falkowski, P.G. & Woodhead, A.D. (eds) *Primary Productivity and Biogeochemical Cycles in the Sea*. Plenum Press, New York, pp. 139-154.

**Book with all chapters written by the same authors:**

Graedel, T.E. and Crutzen, P.J. (1993). *Atmospheric Change: An Earth System Perspective*. Freeman, Oxford, 446 pp.

**Web page:**

*Department of Botany, Trinity College Dublin, Flora of Thailand, 18th Oct 2001, <http://www.tcd.ie/Botany/Research/Thailand.html> Visited: 21st Jan 2002* [Make sure that you state the authors name, title of the page, date page was created or last updated, full web address and date you visited the web page].

- (11) **Figures.** These should be numbered consecutively and positioned within the text, close to the point of first mention. Do not crowd figures with unnecessary text or lines, or shading. Each figure must be accompanied by a legend which is placed below it, and explains the figure, giving enough detail so that the figure can be understood without reference to the text. The legend should not describe the results or include any discussion.
- (12) **Tables.** These should be numbered consecutively and positioned within the text, close to the point of first mention. Each table must be accompanied by a legend which is placed above it, and explains the table, giving enough detail so that the table can be understood without reference to the text. The legend should not describe the results or include any discussion.
- (13) **Scientific Names.** Please note that all plants have a generic name followed by a specific name followed by the name(s) of the taxonomists involved in giving the name to them.

For example, the common Primrose is called *Primula vulgaris* Huds. This name tells us that Hudson (abbreviated Huds.) was the first person to validly publish the name *Primula vulgaris*. Often the generic name is abbreviated after being given once in full (e.g. *Primula vulgaris* could be shortened to *P. vulgaris*). Obviously this can only be done if one hasn't mentioned any other genus beginning with a P - e.g. *Prunella*. Note that the first letter of the

genus name is always a capital (upper case) while the species name is always in lower case and both are in italics.

- (14) **Appendices.** Any other items (e.g. technical details, equation derivations *etc*) that are unnecessary in the main text. Appendices should be numbered. Guidance from the supervisor should be sought in relation to material that is appropriate for inclusion in Appendices. This normally comprises distillation of data, but not analysis or graphs. The appendices may be submitted electronically as part of the thesis, pending advise from the supervisor
- (15) **Printing.** The Department does **NOT** provide thesis printing facilities. Be aware that there is considerable demand on the College PACR printing facilities during February and March. Therefore, plan well ahead and do not try to print the thesis out at the last minute.
- (16) **Electronic copy.** Please ensure that an electronic copy of the entire thesis is submitted along with the hard copies.
- (17) **Security. ALWAYS** keep **TWO** back-ups of your thesis on appropriate media, such as CDs, DVDs, memory sticks, hard drives and your student file storage space. We cannot make allowances for corrupted discs or lost data on submission day.

