Faculty of Engineering
Final Year Project

Writing the Project Proposal

These items form a general guide based on guidelines provided by various departments. While the information contained is generally applicable to most Level 4 Project Proposals, the emphasis placed on each item varies between departments, and some have slightly different requirements. Students should also refer to their own departmental guidelines, or ask their supervisor, for more specific information.

Remember, your supervisor is the primary authority in all matters relating to the project and the report.

Purposes of the Project Proposal

- To situate your project within the research context
- To explain the need for the research
- To establish what is already known about the research topic
- To clarify your own understanding of the project and its aims
- To plan the project in detail

and also...

- To convince your supervisor you understand what you are doing
- To convince your supervisor you have a feasible approach and plan
- To get useful feedback from your supervisor

and finally...

- To get you started on the writing for your final report

Getting Started

The key to a successful proposal – and a successful project - is a clear understanding of the research problem and project aims. The first step is to write a statement of the research problem. This will lead naturally to the aims, and will also provide the title of the project:
Language Focus: Precise vocabulary

Write precisely and concisely, especially when stating your aims.
- Precise writing: each word expresses exactly what you mean
- Concise writing: each sentence is completely clear without being wordy

Draft 1:
Aim: To make recommendations¹ about viable² renewable energy production methods suitable² for the South Pacific region.

Notes:
1. ‘make’ does no useful work because ‘recommendations’ has a verb form.
2. it is not necessary to include both these two words because they have basically the same meaning.

Draft 2:
Aim: To recommend renewable energy production methods suitable for the South Pacific region.

Begin by writing down a Problem Statement, Aims, and a proposed Title, under those headings. Then break your overall goal down into its specific sub-aims.

Research problem:
It is not known how the position of the rider affects the aerodynamics of a fully faired motorcycle.

Project aim:
To determine how the position of the rider on a fully faired sports motorcycle affects the aerodynamic behaviour of the motorcycle.

Specific aims:
1. To perform flow visualisation of a motorcycle and rider in a wind tunnel
2. To measure drag force on motorcycle with rider in different positions
3. To calculate drag coefficients for rider in different positions

Title of project:
Rider Influences on the Aerodynamics of Fully Faired Sports Motorcycles
Language Focus: Weak Aims

**Weak aims: to study, to investigate**
Make sure these are not the only verbs in your Aims statement. Your project may well involve a 'study' or 'investigation'; however, it is unlikely to be your ultimate goal.

To write more specific aims, ask yourself, ‘*Why? In order to achieve what?*’ The answer will be your ultimate aim.

Example:

**Aim**: To investigate the properties of Saponite clay.
**Question**: *Why? In order to learn what?*
**Answer**: To find out if it could replace Bentonite as a waste disposal lining system.
**Aim**: To analyse the properties of Saponite clay in order to determine its suitability for use as a waste disposal lining system.

**Strong aims need a strong verb:**

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<tr>
<th>analyse</th>
<th>demonstrate</th>
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Writing aims for review projects

**Review type projects: to study, to investigate**
Although your project is constructed around a review of the existing literature, it should still have a useful purpose. This may be to collate recent findings to give a broad overview, to identify prominent trends, or to make recommendations for future investigations or development.

To write a strong aim statement, ask yourself, ‘*What am I really doing? How can my project be of use?*’ The answer will be your ultimate aim.

Example:

**Draft aim**: To investigate renewable energy production methods.
**Question**: *Why? How will this be of use?*
**Final aim**: To gain a thorough understanding of renewable energy production methods in order to recommend those most suited to the South Pacific area.

Structuring the report
Refer to your departmental guidelines for required section headings. Where none are suggested you are expected to structure the report as you see fit. The samples below show two conventional structures. You can mix and match elements of both to fit the requirements of your own topic. Remember, the main point is to organize your report so that it develops logically for the reader.

**Note**: Students enrolled in the **Department of Mechanical and Aerospace Engineering** must use the **template** provided on your unit’s MUSO site.
Can you identify where the writer reviews the literature in each sample?

Note: A brief Project Proposal (3-5 pages) usually does not require a Table of Contents. If unsure, check your unit guidelines. However, you will be expected to use sections and subsections.

Sections in the Project Proposal
Introduction:
- introduces your topic in context
- summarises what is currently known, or current state of knowledge (may include theory)
- establishes the problem or ‘gap’ in the research
- states general aim
- briefly outlines the report structure (may be omitted in a short report to save space)

First paragraph of Introduction to a proposal for a project investigating indirect manipulation of cells: Note how the writer jumps directly into the topic and problem.

INTRODUCTION
The manipulation of particles has implications for many different fields of research; however, manipulating small particles on the scale of microns is difficult. Optical tweezers can be used to manipulate small particles by using the momentum of light (laser) to “trap” them (Ashkin, 1997). However, optical tweezers cannot be used directly on cells due to phototoxicity; this is problematic in the field of microbiology (Zharov, Malinsky & Kurten, 2005). A method of manipulating a cell without directly exposing it to intense light is needed; one possibility is that the cell be indirectly manipulated by means of either:

i. Laser trapping a proxy particle and manipulating a particle of interest in close proximity to the proxy particle through inter-particle forces; or

ii. Manipulating the particle of interest through the medium in which the particle is submerged
Excerpts from the Introduction to a proposal for a project investigating solar desalination using reverse osmosis: Can you identify how the Introduction fulfills the five functions listed above?

In recent decades attention has increasingly focused on desalination as a means of acquiring potable water, which has long been a challenge in the more arid regions of Australia …

Under the current climatic conditions the water stores of Australia’s cities have dropped to alarming levels…. It is predicted that in future, droughts will be more frequent and more severe…

Solar desalination is one method of ensuring a supply of potable water throughout fluctuations in the ever-changing climate. Early systems worked on the principle of distillation; other modes have included membrane filtration, electrolysis, ion exchange, freezing and reverse osmosis.

Reverse osmosis (RO) is capable of producing the purest output and will be the focus of this project. It is a natural process in which...

The aim of this project is to establish whether solar water desalination using RO is feasible in the Australian urban environment, in particular in the city of Melbourne…

An overview of the theory underlying reverse osmosis and description of the current technology will be followed by an outline of the proposed methodology….

Note how the writer moves from broad (desalination, Australia) to specific (reverse osmosis, Melbourne) to lead the reader naturally from the general context to the precise topic of the project.

Note also how the writer maintains the themes of climate and potable water to establish the importance of the project.

Reviewing the literature

Most Project Proposals incorporate a brief review of the literature relating to the field of study. Depending on length, or the requirements specified by each Department, the literature review can be either incorporated into the Introduction or presented in a separate section. If the latter, the section should be given a heading which reflects the subject matter, not merely labeled “Literature Review”.

The purposes of reviewing the literature are:

- To learn all the background information you need as a foundation for your project
- To learn the current state of knowledge and/or technology in the field
- To learn about the theory, techniques, approaches, models, hypotheses or processes which will form the basis of your work
- To get a clear idea of where your project fits in the field

The functions of the written Literature Review are:

- to give readers the background information necessary to understand your project
- to fill readers in on the current state of knowledge and/or technology in the field
- to introduce the theory, techniques, approaches, models, hypotheses or processes which will form the basis of your work
- to highlight the gap in knowledge or technology which your project will fill
It is not enough to simply describe what is known or what other researchers have done. You should take an evaluative approach; that is, point out the limitations or weaknesses in the existing research, so that the reader clearly understands the need for your project. You should also show that you understand the developmental relationship between previous studies.

Excerpt from a proposal for a project to optimize electrode design for electrovestibulography.

**Electrovestibulography (EVestG)**

EVestG is a non-invasive technique for recording the dynamic range and response of the vestibular system... The key feature of EVestG is that an excitatory or inhibitory tilt is used as the stimulus in place of an acoustic signal.

The EVestG recording, illustrated in figure 3, involves a single use electrode...

The active electrode currently used for EVestG recordings is a BioLogic TM EChTrode electrode... Whilst adequate EVestG/EChG recordings can be made using these electrodes, high noise impairs the validity and repeatability of results (Hain 2004), and insertion requires the patient to subjectively identify when they believe the electrode has made contact with the tympanic membrane.

As no detailed study has yet been performed regarding optimum electrode design for EVestG, this will be the focus of the proposed research. The future commercialisation of EVestG as a diagnostic tool will depend on the development of a single-use, wirelessly transmitting unit. This will require an electrode design which incorporates a miniaturised electronics unit and user-friendly insertion technique.

Excerpt from the Introduction to a proposal for a project investigating pitting corrosion around welds in a marine environment

The corrosion rate is controlled by biological organisms combined with minor constituents such as trace elements or gases in marine environments (Shifler 2004). However, **many research projects fail to take this into account, and yield results which are inapplicable to marine structures.** The ‘simulated sea-water’ of sodium chloride solutions used in the laboratory does not contain the organic and biological constituents of natural seawater (Shifler 2004), and **test results can vary significantly** between exposure in natural and synthetic sea-water (Eid 1990).

Corrosion behaviour is also known to vary according to the exposure environment (Chakrabarti and Subrata 1990), yet here also **most studies are simulated.** The few undertaken in the field to date indicate that pit depth is greater in natural seawater than in simulated sea-water (Blekkerhorst et al. 1988). Therefore, this project will investigate corrosion behaviour in actual marine environments.

**Note how the writer describes the technology which forms the basis of her project and clearly points out the limitations the project will attempt to resolve.**

**Note how the writer leads the reader to an understanding of the need for her project, using citations as a support for her own statements.**
Method:
- describes your intended approach
- discusses techniques, equipment, software to be used
- discusses scope and limitations to your project (assumptions, resources available)

Break your project down into a series of steps or stages. This will form an outline from which you can write the Methodology section, and a framework for writing the Research Plan.

Title of project:
Instabilities in Contained Toroidal Flows

Research Problem:
There exist instabilities in the toroidal flow in cylindrical mixing vessels used in many industries. These instabilities reduce the mixing efficiency and cause losses of millions of dollars. However, their causes are not fully understood.

Project aim:
To identify the mechanisms behind toroidal instability

Stages of research:
1. Obtain thorough understanding of theory underlying toroidal vortices in cylindrical vessels and of recent studies in this area
2. Design and build a test rig
3. Select dependent and independent variables
4. Record flow structure and temporal characteristics using video flow visualisation, PIV and spectral analysis for a number of flow cases

Sample Methodology from a proposal for a project to optimize electrode design for electrovestibulography.

The first stage of the project will be to acquire a detailed understanding of vestibular anatomy and physiology and EVestG and ECochG recording techniques. A computer generated model will then be developed to simulate the physiology of the ear canal. CST Studio Suite is a 3D electro-magnetic simulation tool suitable for this task. However, it is likely many assumptions including geometry of the ear canal, and electrical properties of surrounding tissues may be introduced into the model. This is a significant limitation and may impair the validity of results.

A series of CST Studio Suite simulations will be used to generate information about the conductivity of vestibular nerve responses throughout the 3D space surrounding the inner ear. The data will be analysed to determine optimum electrode placement and properties. The OFFERS design strategy (see Appendix 2) will be employed to assist with the design process.

To confirm the validity of the simulation, experimental tests will be performed. The exact protocol for experimental testing will be determined by simulation results. Experimental testing will involve a similar procedure to the existing EVestG technique and will be subject to ethics approval.
Research Plan: provides a detailed plan of the stages and tasks involved in the project
- refer to the series of steps or stages you outlined in the Methodology section
- outline tasks within each stage, in detail
- identify concrete outcomes for each stage
- List resources required with a statement of availability
- include a separate Timetable detailing each task in each stage, outcome, and completion date

Excerpts from a Research Plan from a project proposal for optimizing electrode design for electrovestibulography.

### Stage 2: Modelling

1. Test the suitability of CST Studio Suite for modelling vestibular physiology
   - Create a test model with impulse signal to simulate nerve, surrounded by basic biological material (skin, bones, etc).
   - Determine most usable simulation outputs.
2. Develop basic model of ear canal physiology and conduction of vestibular neural responses using CST Studio Suite
3. Use model to test the effect of various recording conditions, including variations of electrode and conductive gel position and properties. This may extend to variations in anatomy as is observed between healthy individuals.

**Outcome:** Simulation data showing likely vestibular signal conduction and variation between recording conditions

### Resources

The key resources required for this project are access to EVestG recording equipment and consultation time with specialists in their use, including Dr Nina Langer and Mr Han Li Min of Precisionautics Ltd. All other resources required for the successful completion of the project are available through Monash University. This includes access to literature and CST Studio Suite software.

Contribution of proposed research:

Explain how your project will contribute to the advancement of knowledge in the field and/or its real-world application. Contribution to the advancement of knowledge is often very small; it may be simply a confirmation of results obtained by another researcher or evidence that a particular method is suitable or not suitable for a certain application.

Excerpts from a) the above proposal and b) a “review” type project investigating renewable energy options in the South Pacific

**a)** It is expected that the proposed research will provide a review of previous studies into EVestG/ECochG electrode placement and design. The modelling, design and experimental phases will provide a basis for future development of the EVestG technique. Ideally an electrode designed as a result of this research will be suitable for use in future clinical applications.
b) This research will contribute insights and recommendations regarding renewable energy production methods suited to the South Pacific region. The project will also produce a working framework to guide the South Pacific region’s search for viable renewable energy production methods, which may also prove useful to other nations seeking renewable energy options.

If unsure what your project will contribute, ask yourself, ‘What will exist at the end of this project that did not exist before? Who will be able to use this knowledge/program/process/model/review?’

Language Focus: Academic Style
How many style problems can you find in the following text?

This research will hopefully go some way towards plugging the gap in renewable energy production suitable to the South Pacific area. There’s a huge lack of natural resources in South Pacific nations so, with global warming reaching crisis point, the need is getting more urgent day by day. Nevertheless, to date their hasn’t been a lot of research on this topic.

This project aims to produce a working framework to help the region find viable renewable energy production methods. It is further hoped that the recommendations will spark further research in this field.

1. Casual style: The writer uses colloquial expressions suitable for everyday speech, but not for academic writing; eg: plugging the gap, reaching crisis point
2. Casual vocabulary: getting more urgent; becoming more urgent, a lot of, spark
3. Faulty agency: The ‘gap’ is in knowledge about renewable energy production, not in the production itself.
4. Incorrect prepositions: suitable for – suited to, research into
5. Spelling: there/their
6. Contraction: Incorrect - hasn’t; Correct - has not
7. Repetitive Vocabulary: research, further
8. Unnecessary words: hopefully

Citing and Referencing
You will be expected to cite and reference your source material correctly. See:
- The Library’s online tutorials (http://www.lib.monash.edu.au/tutorials/citing/)

Resources
Reporting the 4th Year Project
Engineering Online Resources

Writing the literature review
Language and Learning Online