5.0 THE SEMINAR

5.1 Introduction

The seminar is an opportunity for you to demonstrate your ability to:

1. give an oral presentation to your peers, members of the academic staff and others who are interested on your project topic;
2. support that oral presentation with a multimedia presentation, most often a Powerpoint slide presentation

Your seminar will be scheduled towards the latter part of the semester. Some points to note with regard to the presentation:

1. A list of seminars, where they will be given, the times for each and the session chair will be issued about a week before the event.
2. Each seminar session normally has eight speakers. The session is chaired by an academic member of staff
3. Each speaker has 15 minutes to present. This is strictly enforced. Then follows up to 5 minutes of question time and five minutes for changeover.
4. Students who are working on different aspects of the one problem will normally be grouped together. In this case, 5 minutes may be allocated for one person to present an overview so that the actual seminars may focus on the topic of concern.
5. A PC will be available the day prior to your seminar to enable you to load your multimedia presentation. You are expected to use that. You may, however, bring your own lap top if you use a Macintosh or Linux system,

5.2 Creating your multimedia presentation

The first step in creating your seminar is to create your multimedia presentation. As this will support your oral presentation and it will largely be the focus of your audience's attention, it needs to be carefully designed and prepared.

In most cases, it would be expected this is a Powerpoint slide presentation. However, you are not obliged to do so. Apart from the obvious of using a different slide generator, there are circumstances where you may choose to use an entirely different approach including using normal plastic slides and a projector. It is up to you to decide how to maximize the effectiveness of what you do over the time available.

The first part of your presentation must be a slide giving:

1. the title of your project – the expected title of your thesis;
2, your name and student ID;
3. your supervisor, and co-supervisor if you have one;
4, if this is an industry sponsored project, the organization supervising you.

You need to put this up while you are preparing. The chair of the session will tell you when to begin your presentation proper.

Your will often find it much easier to give your oral presentation if your second slide is a summary of the key points of your presentation. Similarly, your last slide can simply be 'the end' or 'any questions'.

Your seminar needs to be divided into three parts:

1. What was the problem you set out to solve?
2. How did you go about solving that problem?
3. What was achieved?

Given that you only have 15 minutes to speak, then each of these needs to be covered in about 5 minutes. Thus your seminar is just a very broad overview.

Some comments on creating a presentation:

1. Remember that your audience is going to look at your slides first, then listen to what you have to say. That has two implications:

i. Each slide needs to be simple. Probably no more than three sentences.

ii. You need to keep the number of slides to a minimum. In general terms, anything beyond one slide per minute is 'busy' and that means you entire presentation reduces to 45 sentences.

2. The problem with a seminar is not what to include, but what to omit. Therefore, you do not have time to discuss all that was accomplished, only what you see as the major achievements.

3. Some technical issues:

i. Remember that your slides will be projected in a darkened lecture theatre. That means it is generally best if you use dark colours for fonts and light for backgrounds.

ii. We have no control over the colour calibration of the projector. Therefore, do not rely on subtle variations of colour to transmit information. Thus also means a pastel background will probably be washed out

iii. In general, a serif font is best for sentences as it increases legibility. That is a font like Times used in this text with the end-caps on letters like "I". Headings can be a sans serif ('without serif) like Helvetica. Fonts in general need to be quite legible and that tends to favour fonts like Times, Arial, Helvetica and Geneva.

iv. If you embed an animation, or video sequence, do not assume it will necessarily run on our systems or for that matter it will run well. Our machines may not be as recent as yours, and they may not have the same software installed.

v. We can scan a document such as a drawing, but think what this will be like when projected.

5.3 Creating your oral address

Having created your multimedia presentation, you have created the structure of your oral address. Some points:

1. **PLEASE NOTE THE LATER SECTION ON ASSESSMENT.**
2. Put down in bullet form any extra issues you want to raise. You might like to use Powerpoints notes page feature for this.
3. Practice speaking on what you want to say until the timing is correct. Remember, you have NO MORE than 15 minutes. You WILL be cut-off if you exceed that time, and that can have a quite devastating effect on your ability to communicate what you have done,
4. **DO NOT CREATE A WRITTEN ADDRESS AND RECITE IT**. Remember this is an oral presentation in which you are being judged on your oral communication skills. To simply read a document defeats that,
5. The great dangers in actually giving the address:
    i. Due to nervous energy, time may seem to linger. There is the danger of 'ad-libbing' and then running out of time.
    ii. Take your watch off and make sure you keep to your time. Use 'markers' in your address to judge how you are using time.
    iii. Many people have a problem finishing; they feel they have to keep talking or explaining. Determine a simple ending and stick with it.
    iv. Don't apologise. The presentations are brief, but one of the reasons for that is to test your ability to concisely summarise what you have done. Simply present.
    v. Plan that things can go wrong and so determine a workaround. In particular, Murphy's law suggests that if the video worked on your machine then ours, it could well fail on the day. So, if you really need that video, what are you going to do if it fails to run?

6.0 WRITING THE THESIS

6.1 Introduction

There are four pivotal questions regarding theses:

- What is a thesis?
- What purpose does it serve?
- For whom is it written?
- How should it be written?

None of these has a very simple answer.

The importance of the first question is due to the confusion over the issue. A thesis is NOT an elaborate laboratory report, a technical report, a written tutorial, an essay or a literary creation. It is a particular written communication with its own unique format, both physical and logical. Like these other forms, it needs to be in clear, grammatical English, but that is about the only commonality.

A thesis reports intellectual work done. Since it is reporting completed actions then it is written in the past tense. It is a pure communication in the sense that it communicates the reasoning behind various decisions made. This tends to make a thesis something of a dull read, but then it is a document intended to be carefully studied given this intellectual content.

The purpose of a thesis depends on various viewpoints. From your viewpoint, the purpose of your thesis is very clear; it is an instrument of assessment. That is to say, it is the means by which you demonstrate how well you have met the project unit objectives. From your supervisor's and the Department's viewpoint, it demonstrates the quality of work graduates of your course are capable of achieving. Thus theses are evidence to submit to visitors to the University and to accreditation panels.

Two other groups have an interest in your thesis.

Students following you will want to know what you did, why, what did you achieve and what are you recommending as they may be undertaking a further development of the problem you tackled. They also of course, want to know what is expected of them, so they wish to identify what they think were the key elements of your success.

The fourth group may not be apparent to you at first. The objective of the project unit is to demonstrate your capability. That is something an employer is interested in. The fact you might have achieved 75 in some unit termed "Circuits and Systems" is fascinating and suggests you are quite capable, but it has no real meaning to industry. How do they compare you to another applicant for the position from another institution on the basis of such results? However, virtually every university in Australia - and indeed the world - has project in the final years of engineering programs. Reading your thesis will say a great deal about your ability. Further, it is very easy to make a comparison of two different final year reports and make a good judgement. All that remains for that employer, then, is to judge your personal qualities in interview.

Three incidental points. Always quote the URL of your thesis when applying for a position. It will be on the Department's servers usually by the end of the year in which you complete and stay there for some years. Second, make a very good copy of your thesis, have it properly bound by an accomplished bookbinder and take it with you to interviews. Finally, take a CD of it to leave with them if they wish it.

First and foremost, as your thesis is primarily an instrument of assessment then it is written to communicate clearly with your examiners. However, there are other readers. You need to take their needs into account to some degree, but the focus must be your examiners. Although this suggests an important question to ask is who are they. that is irrelevant. What is far more important to note is that your examiners are expert or at least quite knowledgeable about your project topic.

This has several implications. A very important one is that you do not explain nor do you attempt to 'guide' the reader. What you do is justify your actions and so you write on that basis. That means you write in the third person; do not use the royal 'we'. Recognise that all opinions expressed are assumed to be yours unless you specifically reference someone else's written work.

For a graduate thesis, you largely ignore the secondary audience. However, you need to ensure that your referencing is such that any reader who is confused or uncertain about anything you say can, with a bit of effort on their part, locate information to satisfy them. For an undergraduate thesis, you are allowed a little more leeway and under certain conditions you may put in some semi-tutorial material. This is discussed ahead. However, this is still a thesis and the operative word here is 'little'.

Writing a thesis may seem a quite daunting task, especially when you note the detail contained in this chapter. For various reasons, many students find this one of the more difficult parts of the entire project. It shouldn't be. The format is prescribed and you have plenty of aids to assist. All it really should be is time consuming.

6.2 Another view of a thesis

Recall that the primary audience to address in writing your thesis is your examiners. You need to communicate what you did in full and your interest is to do so in such a way as to gain the best possible assessment. So what is the examiner interested in? The details of assessment are given later, but this does not describe the process of assessment. Let us consider, then, how an examiner is likely to approach reading a thesis and so how they reach a conclusion on the result. Now of the two examiners, one is your supervisor and the other is an independent person who may know you, but not your project. This is the person we need to consider here.

This person will have been asked to examine because they have some background in the subject topic of your thesis. However, they are probably examining out of a sense of duty rather than because they are enthused about what you might have done. They are given your thesis at a busy time of the semester, they know reading your thesis is going to take at least an afternoon and it is probable they are not looking forward to it. Remember that.

What is the first thing that any person sees with respect to a thesis? It is the title on the front. This is one sentence, but a vital sentence. It needs to state in overall terms exactly what this thesis is about. Thus that title needs to include your principal keyword.

Now the thesis is opened. The first text the reader will seek out is the **synopis**. That is, a paragraph that extends the title so giving more details on what the thesis is about and including all the other keywords. (Note it is one paragraph; it is not a summary nor is it a discussion.) How should the synopsis be written? It needs to draw the reader in, inform them, titillate them and get them interested in the good things in store.

Remember, too, your secondary audience. If your thesis title is something like "Design of a low noise amplifier" then the topic is clear. Someone wishing to know something of that is drawn to your thesis. For them, then, the synposis needs to state how low noise, for what purpose, what bandwidth and so on. That is, it answers the question this thesis does or does not have information of interest to me.

Moving on, the next text the reader wishes to encounter is the thesis index. Again a vital element. Why? The obvious answer is so that readers can locate the parts of the thesis of interest to them. However, consider its significance for the first time reader – and an examiner. An index effectively consists of one line summaries - the headings - of each item of text in the body of the thesis and so is a summary of the entire thesis. It also shows what you consider the major points of your work and how you have developed

them. Thus the index will - and needs to be used to - create an impression. In particular, an impression of thoroughness and organisation. Carefully craft those section headings so they do this.

The index is critical to all theses, but for the moment just consider how important it is in a graduate research thesis. Here, the thesis examiner is usually external. They are a busy person, they get very little reward for examining and indeed their only interest is whether the research reports something of value they may be able to use in their own work. They are also expert in their field. They therefore know what you should be writing about. What do you think are the chances of two theses when one just has nondescript one word headings and the other has sentences showing all problems that should have been tackled were and all issues are properly surveyed?

Incidentally, a very broad answer to the question of how to write a thesis is to create a set of keywords, write the title, write the synopis, create an index and then under the index headings, list in point form the key topics you will write on. That is a very good way of ensuring balance in your thesis.

As will be explained later, an examiner expects to find in a thesis is a set of chapters with a variety of titles that he or she could interpret as meaning:

Introduction
Background
Detailed problem statement
Detailed problem solution
Verification of the proposed solution
Conclusions

Once into reading the thesis proper, the examiner begins with the Introduction chapter. The synopsis will have told the examiner what the thesis is broadly about, thus the introduction must expand on this. What is expected here is three major sections:

1. The first section should set the scene as it were. Any project examines one very small part of a larger problem, thus that larger problem needs to be mentioned. What an examiner expects to see is a set of arguments something alone the lines of:

   communications is one of the most rapidly growing industries
   optical fibres are important for implementing communications
   a problem with fibres is joining them
   what is needed is a test unit to easily verify joins
   this project report discusses a test unit to verify joins

   Note this. Setting the 'big picture' and then slowing moving down to the specific topic. Thus you have justified that there is an important general problem to solve and, having established that, which of the specific problems associated with that general problem is the topic of this report.
2. Your thesis is an intellectual endeavour. Therefore, what are you claiming are the significant intellectual achievements of this work? In this second section you need to discuss (briefly) the key problems encountered, how they were tackled and a brief overview of what you see as your significant achievements. You are hinting to the examiner of the good things that await. You are selling your work, in fact, and trying to arouse the reader's interest in the detailed description that follows.
3. The index certainly defines the structure of the thesis, but it is a little terse. Thus the third part of the Introduction usually expands on the layout. This is not a repeat of the index; rather, a few sentences are used to describe the basic contents of each of the chapters.

Do note that an Introduction is just that. It introduces. There is a fine line between a summary and an introduction and, for that matter, an overview.

The examiner will now move on to read the background chapter. There is a very important point to make about this chapter. **It is not a tutorial**. The examiner understands the field; what he or she is looking for is evidence you do as well. This chapter defines the environment in which the project was done. You need to demonstrate in this chapter that you understand current practice and ideas defined in the literature. Thus it is a justification not an explanation,

Why? How can you claim your solution is 'best' if you do not understand appropriate concepts and all the options the profession has been exploring? In some way you have to communicate that the solution you later introduce is valid because it is based on the best current understanding of the problem.

An important point to make on this. Many students feel it is necessary to write pages on every topic associated with the project. **NO IT IS NOT**. Most you can simply reference – that shows you are aware of them. The focus of this chapter should be on those elements important to the solution you are proposing, what you understand is important about them and so what influenced your thinking on arriving at a solution.

In an undergraduate or coursework masters thesis, this chapter should show you have read widely on the topic and reviewed all possible avenues to a solution. That means the reference list is effectively an extension of this chapter. Care needs to be shown in compiling that list and also in referencing it. Nothing is more painful than a thesis where the references are clearly an afterthought, are not the major references on the subject or are largely inaccessible. References are evidence for the views expressed. Use them in that way to back your arguments.

The background does not have to be one chapter. There are projects where the background may have two – or more – significant elements and so a structure of two or more chapters is appropriate. This is especially so at the graduate level. Also please note that it should not be called 'background'. Address the problem! It should be called 'some theoretical approaches to the design of power invertors' or such like that conveys what it discusses.

Now you may think the examiner will simply move on to the next chapter at this point. Untrue! Most will now go straight to the conclusions chapter. Why? The examiner should be expert in the area, thus everything in the intervening chapters should be fairly obvious to them and the only question is whether you have got it right or not. The question that interests the examiner at this stage is what did you achieve? Then there is the question of your analysis of your work. What are your recommendations for future work? What do you think was the most significant part of your project work? What are you nominating as the most significant problem solved?

At this point, most examiners would have a pretty good idea of what result they intend to give. The earlier chapters will now be read, largely just as a confirmation that you have the skills and abilities implied in these key chapters. In addition, of course, to check that you haven't made any serious mistakes. Nevertheless, there are some key points to check. In particular, your test procedures and results. However, if you have not impressed the examiner by this earlier point, then you are in serious trouble.

Graduate theses are examined in a similar fashion, but it is more exacting. A far tighter, more closely reasoned and intelligent product is expected. An undergraduate report is merely attempting to show potential and the total assessment depends on more than the thesis alone. However, for a graduate thesis assessment is directly of the thesis content and it is judged on intellectual merit as well as technical.

The first part of the Introduction must very precisely define why the topic was worth investigating. That is usually is done in a two-pronged approach. First, by showing that the general problem is of importance as outlined above. Second, by discussing possible applications of the work done and showing the significance of these. The second part of the Introduction must also clearly state why this is a singular piece of work.

The background is also a critical chapter in a graduate thesis. Superficially, it is similar to an undergraduate thesis, but in practice is quite different. An undergraduate background chapter is largely a piece of reportage. However, a graduate background chapter is more a critique. What the examiner is seeking is evidence you have read the literature very carefully and broadly. You are expected to compare different approaches, commenting on their strengths, weaknesses and possible variations. Coupled with this, the examiner will look very carefully at your list of references. As an expert in the field, the examiner will be expecting to see certain recent seminal papers in the field in that bibliography. The dates of articles and the journals in which they were published will be very carefully noted and probably checked. Whatever you do, make doubly sure every reference is absolutely correct!

The conclusions in a graduate thesis are literally the keys to success. The examiner expects to see a very closely reasoned intellectual arguement. Recommendations now are expected to define where future research should be directed and that demands considerable logical arguement and interpretation of the work you have done. This chapter needs to be very carefully worked and extremely carefully reviewed.

Graduate research theses are even more stringent. The regulations for Ph.D degrees throughout the world state that a thesis must be a 'substantial and original contribution to knowledge'. Now knowledge is not information. What this means is you must justify the problem was worth solving. There is also a higher requirement of originality.

A critical point worth concluding this section with concerns opinion. Unless otherwise stated, everything in your thesis is taken as your opinion. No one else's. Yours. You do not have to state " in the author's opinion"; that is a tautology. The whole point of having references is so that you can make it clear that an opinion expressed is not yours. You quote them to show others hold that view and through your writing, you can make it clear you either sympathise with them or not. Of course, references also show the source of other information. Note that if you do quote a reference, then you can quote literally (in which case the quoted words must be between quotes) or you can paraphrase or summarise. If you quote literally and do not use quotes, then you are plagiarising and in the academic world, that is a form of suicide.

6.3 The how of writing

At the risk of repetition, what is involved in the practice of engineering? It is defining the problem and examining the specifications. Then it is proposing solutions followed by the construction of a prototype to prove feasibility. What is the problem here? Writing a report of many pages on a complex topic in which many ideas must be explained. Are there specifications? Yes; the conditions described in the pages following. How to propose solutions? Easy. Sketch out the indices for a number of possible theses! That shows your broad organisation and reminds you of what you need to do. Now select the best. How to create a prototype? Remember top-down design? Then under each index item, just list the key points you wish to stress and which figures you wish to include. Now check the design again. Perhaps some modification is needed, so return to the beginning and begin some iterative refinement. This is planning and just like engineering design.

It is interesting to note a recent book on technical writing devoted 100 pages to planning, 100 pages to execution of the plan and just eight pages to the actual writing. That is very reasonable.

In this regard, it is useful to point out that you suffer a serious disadvantage compared to students of two or more decades ago. At that time a thesis had to be written by hand then laboriously typed. That is an advantage? Yes, because it forced the writer to plan very carefully and think about what they were doing. You face the disadvantage of the PC and that offers two deadly traps.

One is you may overlook the importance of editing. Remember that the objective of a thesis is to communicate. Given the time it takes to write a thesis, then it is hard to ensure you have communicated as effectively as possible. Editing is the intellectual process of reviewing what you have done, assessing whether the structure and paragraphs communicate as effectively as they might and then implementing changes to achieve that. Clearly, a thesis is an edited document and indeed needs to go through several such editing stages. (Note the later comments on the draft.) A computer is very good at cutting and pasting, but that is only the last of these editing actions and the least important.

The second problem is that modern word processors include spelling and grammar checkers. Spelling checkers are fine, but make sure they are checking for Australian spelling, not American. Further, note that all they tell you is that the word is spelt correctly. They do NOT tell you if that word is appropriate or even makes sense. For example, you may mean "in" but typed "inn" and both are legitimate words. Grammar checkers are quite different and need to be treated with caution. While there is a core grammar applicable to any written document, specific grammatical context can vary from use to use. Most grammar checkers only check for very broad contexts. Further, because of the extreme difficulty in creating a grammar checker – it usually requires an understanding of the sentence – all they can really do is check for glaring mistakes. Hence why most just focus on plurals and some punctuation. Thus just because nothing is flagged is no basis to assume the grammar is correct. Again, there is no substitute for careful editing.

A useful hint on editing. Once printers (the people) used to present galley proofs for editing. These were the document printed out on long thin strips. This breaks up the visual appearance of the text and so overcomes the problem that after a few editing sessions what you see is what you want to see, not what is actually there. This is a very effective way of locating faults. So is changing the font.

Make a plan for producing your thesis. One would be the following:

1. Write each section as outlined in your index as naturally as you like. Make sure you complete it in one sitting and cover all the items in your outline. Now go and do something else. Then write the next section and so on.
2. On the second pass, run your spelling checker over the text. Then read the text so that you don not muck mistakes like having correctly spelled words, but ones which makes non sense within the context, or where words words appear more than once. Turn your grammar checker to 'technical' and check the grammar for the bad mistakes these can identify.
3. Now you need a series of passes that check the structure. As a written document, the structure is and should be quite complex. So, in the first of these stages make sure the broad communication is correct. That is, make sure the arguements are logical. Make sure ideas flow and link appropriately together. Challenge your ideas and make sure the answers are written there somewhere.
4. Now begin the passes that check on the technical writing. Again, this begins by looking at the broad structure. Make sure paragraphs really are paragraphs. That is to say, they have a beginning, development and end, and that they can stand independently.
5. It is very important in this that you separately check the sentences of the paragraphs. Make sure you avoid literary devices like short sentence fragments or sentences beginning with conjunctions. These are fine for poetry or literature, but have no place in technical writing. In particular,

make sure your sentences clearly state your message and do not go on for too long or use too many words like conceptualising because long Latin words are confusing and long sentences make it difficult for a reader to follow the arguement and understand what it is that you are trying to say and also do not believe that this problem can be overcome by punctuation because if your read a good book on English you will discover that this is not really the purpose of punctuation. Also take this opportunity to remove redundancy. Many students insist on making the same point twice (or even more times). Don't. Ask yourself is this sentence really necessary, and if you cannot answer positively, then remove it.

5. You need to check for the obvious features of a technical communication. Ensure completed events are expressed in the past tense and those that are time-invariant are in the present. See the section below on this. Further, scan the entire document for 'I' (and 'you' plus 'we') and eliminate.
6. Scan for grammar. Make sure more than one uses plural verbs and one singular. Make sure adverbs precede verbs. Adverbs are those words mostly ending in 'ly' that sporting commentators cannot pronounce as, for example, in that hoary old favourite "all the boys done a real good job". Make sure you avoid cliches including new ones such as "at the end of the day, …". Try to avoid split infinitives. (Do you know what they are?)
7. It is vital you scan to ensure the punctuation is correct. English, like any human language, is ambiguous. The purpose of punctuation is to make clear to a reader what you wish to communicate. A very subtle example; the phrase "no dogs please" (when many do) has a very different meaning to "no dogs, please". Punctuation is discussed in more detail later, but some quick points. A thesis never uses ! and rarely uses ? as questions, especially rhetorical, have no place in a thesis. Colons and semicolons have some specific roles in technical English. Be very careful about using commas and apostrophes and do note they are different.

8. Again a general point. Generally avoid foreign words unless there is a good technical reason to use them and you never underline words or otherwise **emphasise** by bolds or CAPITALS as, once more, this has no place in a thesis. That is like email shouting.
9. Now scan for simple things like text where you inadvertently put in too many spaces due to editing , or where you typed a comma like this last one and made to look like a shag on a rock. Or where you do the same to a full stop. Check that the thesis conforms to the requirements listed ahead.

6.4 The draft

It is a requirement of the project that you submit a draft of your report to your Supervisor. There are several reasons for this:

1. Since this is going to be a very public document, you need an independent 'editor' to review the structure, contents and format. In addition, someone to suggest ways in which you might better express your ideas.
2. You are far too familiar with the work. You need someone to check to make sure there is nothing left out or, for that matter, there is nothing included which shouldn't be there.
3. You also need someone to check the equations, the terminology, the opinions expressed and similar issues.

Your draft forms part of the assessment procedure in that you must submit one. However, it is important to stress that it is NOT assessed. Any result you gain is a function of the corrected draft; the final report; not the draft itself.

It is natural for students to want to know what is expected and so to refer to past projects. There are two comments to make here. First, the final project result depends on more than just the project report alone. Therefore, check inside the thesis you are interested in and ensure that the indicator 'Presentation' is marked excellent. Second,

note that there have been changes in format in recent years. As a result, do NOT take as a guide any thesis prior to 1990.

It is important to comment that your supervisor will not extensively correct your English and in that sense are not a true editor. They will only point out there is a problem. Further, the thesis must be in **YOUR** words, If you are uncertain about your ability in written English, then you need to do some extensive reading on technical writing and find someone who can advise you.

6.5 Format of the thesis

6.5.1 Introduction

Theses must meet quite rigid standards, covering structure and contents. These **MUST** be followed. Do note that all reports will be examined by both your Supervisor and others to check that they meet this standard. If they do not in any respect mentioned here, then they can be rejected. That means, for example, if you use 'we' or if your bibliography is not alphabetically sorted or one figure is not numbered and so on.

Please note this Guide is in exactly the format required. It differs from a thesis in that it uses a more literary style of writing, but the structure is the same.

6.5.2 Physical presentation

The physical presentation must conform to these standards:

1. The thesis must be printed on a modern laser or ink-jet printer. Handwriting in any form is unacceptable in **ALL** circumstances. In particular, handwritten symbols must NOT be used.
2. Only one grade of A4 size paper may be used. That is, it must be from the same ream. You should check the quality of the paper ensuring that it has no flaws, is not water damaged and is of a uniform white colour.

3. Schematics or large drawings may be produced on larger size sheets, but folded to fit into an A4 format. These may only be placed in an appendix
4. Only one font may be used for the text; a standard 12 point serif font preferably Times or Times New Roman. You may use a san serif font like Helvetica or Arial for headings if you wish.
5. On each page, the margins are to be as follows:

Top	2.5 cms
Bottom	2.5 cms
Left	4 cms
Right	2.5 cms

   Typing is to be on one side only.
6. Typing is to be double spaced and justified on the page. Words may not be split at the end of sentences. Paragraphs are not to be indented.
7. All headings are to be left-justified. Sub-divisions of the form '2.3.1' are to be indented an additional one centimetre. You should be questioning your structure if you proceed to a '2.3.1.1', but of you feel the necessity, indent a further centimetre.
8. All chapters are to begin on a new page.
9. Figures and tables should be placed at the top of a page and aligned to the right margin. You may use your discretion on this, but try and be consistent in the presentation. Do not wrap text around a diagram. Ensure all diagrams are numbered and have a title. See below for details. Note that a figure means a graph, photograph, schematic, drawing or a set of these.
10. Pages are to be numbered from the first chapter. The numbers are to be placed, without punctuation in the centre of the page at a point 1.5 cms up from the bottom edge.
11. Pages prior to Chapter 1.0 are to be numbered using Roman numerals starting from the page after the Introductory Letter. These numbers are also

to be without punctuation in the centre of the page at a point 1.5 cms up from the bottom edge.

12. Headings must be as per this Guide. However, you may highlight by either underlining or using bold as here. Note the use of capitals in chapter headings, but their more limited use in other headings. See the later comments on this.
13. See the later comments on numbering.

6.5.3 The thesis covers

Theses must be bound in the prescribed manner. On the spine of the thesis you need to include in gold lettering:

The year

Your family name followed by your initials

A short title.

On the front cover of the thesis you need in gold lettering:

The degree for which you are submitting this thesis

The full thesis title.

The cover must be produced by the University Library Bindery and they will add to the front cover a Curtin University logo plus the Department's name.

The covers are in prescribed colours. They are:

Bachelor of Engineering	black
Bachelor of Technology	green
Master of Engineering (Coursework)	black

You will need to order the covers from the Library around the first of October. You are required to bear the cost. The cover is of standard width. You need to punch your paper copy and screw it into the binder.

Research graduate theses are bound like a book. This is done by the library and not until the thesis has been examined. The Graduate Handbook gives details.

Given the thesis cover is a standard width, then what do you do if you have a very large thesis? This is an unusual situation, and you should see the Projects Coordinator.

6.5.4 Writing style

The thesis must be written in grammatically correct Technical English. Given the ready availability of spelling and grammar checkers, there is no excuse for obvious mistakes. Spelling is to conform to Australian standards, not U.S. or British. The reference you should use is the Macquarie dictionary. All values must be quoted in SI units (unless for some reason you are referring to historical information). If you are uncertain of how to write in technical English then read a standard reference such as:

Anderson, J., Burston, B.H., Poole, M.E. Thesis and Assignment Writing

Winckel, A., Hart, B. Report writing style guide for engineering students.

Both are in the Library and the second is available online from the University of South Australia. Note these are only a guides; the required standard is that discussed here. There is no Standard on technical English, but there are standards on particular aspects of it.

If you are uncertain on how to write English properly, then you should also consult a standard reference. A very good little book for this is:

Bailey, R.F. A Survival Kit for Writing English

This is very good if you are uncertain on how to use punctuation. Please note in these and similar books the comments on how to form paragraphs and sentences.

Some of the basic issues in writing a thesis have been discussed. In particular:

1. It is a factual document that describes technical activities. Therefore, it is devoid of literary devices such as segment fragments, exclamations, iambic pentameters and so forth.
2. Being factual also means words like 'about' are rarely used, and expressions like 'it rotated quite fast' are replaced with an exact value of speed or a reasonable estimate.
3. A thesis does not have underlining or bold or capitals within the body of the text. They are only used with headings.
4. It uses italics in very limited circumstances. Depending on the style, it may be used in listing references. It may also be used to indicate that text is a direct quote, but this is not essential.
5. It is a justification of decisions made and actions taken, thus it is written in the third person. That is, it was done, not I or we did. Very rarely, if ever, do you ever need to specify yourself and in those very rare circumstances you are 'the author'.

A key point to note is that having decided on a style – this document does not describe every situation so you will have to make some decisions of your own – then you must consistently use it.

By far the major problem most students have in writing a thesis usually relates to tense. Now a thesis writes about events, artifacts and knowledge. Then:

1. When the thesis is written, the events should have completed. That is, decisions were made, measurements were taken. The language reporting events is therefore in the past tense indicating that completion.
2. What to do if an event is not complete? For example, a standards committee is still meeting. You typically would write "at the time of writing, the Committee had not reached a decision, but it is widely believed…". That is, highlight the fact the event will conclude at some time

of the future, and probably has by the time most readers begin examining your thesis in detail. Think about why 'had' is used here rather than 'has'.

3. Artifacts may be referred to in generic terms or specific. For example, the 68HC11 microprocessor as a generic device to program or a specific one you used to implement part of your project. The generic artifact may still exist at the time of writing – because it is still manufactured – or it may not. Specific copies may exist too, but then the one you actually used may have been destroyed. Thus you need to exercise some care on how you refer to artifacts, taking into account the situation at the time of writing. In most instances, though, you will find the 68HC11 is a microprocessor at the time you write your thesis (meaning the generic but possibly a specific chip as well), but of course your tests of it were done in some way.
4. Knowledge is quite easy to deal with, but it may seem a little confusing. To illustrate, Jones might have written a paper in 1989 in which he expressed a particular opinion. Then in 1995 he might have had a different one. If you are referring to the first paper, is this "Jones stated" or "Jones states"? The answer is the second, because that opinion was published and so remains evermore. It has become knowledge. You might include in the text that Jones changed his mind because it is important to your discussion, but his first opinion is still an "is".

Some other elements of writing style:

1. As a general rule, if a number is between one and ten, then spell it out. If it is larger, then leave it in numeric form. For example, "over the course of ten meetings, the standards committee… " but "on no account must more than 1000 volts be applied to this system". However, if you are dealing with very explicit numeric values – measurements for example, - then remain in numeric form.

2. Do NOT use the common abbreviations of written English. That includes contractions like “don’t”, but more particularly the common Latin abbreviations ‘etc’, ‘e.g’, ‘viz.’, ‘i.e’, ‘cf’, ’Q.E.D’ and so forth.
3. Do not use symbols unless they are part of a measurement, formula or standard descriptor such as a URL. That is, ignore %, &, +, -, @ and so on. Spell them out.
4. Do not use foreign words unless there is a very good reason. In the main, the only reason is that they are the name of a person or a commonly used technical term in English like sans serif.
5. Some abbreviated Latin words commonly used in referencing may be considered if you wish. One that is very standard is ‘et al.’, literally ‘and others’ used when there are multiple authors. Another useful one is ‘ibid’ meaning that you are referring to the last work cited. If it is to another page, you use (ibid, p.10). Others that are used like ‘op. cit.’ require some care in their use. A final useful term is ‘(sic)’ meaning that what you are citing is exactly as was written. This is normally used in literature when in your opinion there is a grammatical or spelling error. A thesis, though, accepts there are several standard spellings. Thus this is rarely used, the exception being mis-spelt names, places and quantities.
6. Do NOT use footnotes unless they are absolutely essential. There are very, very few circumstances where they are needed in a technical thesis.
7. Acronyms present a particular problem, especially given how they are so widely used in any technical communication. If you believe the acronym is understood by your readership – such as ANSI, SAA, or SI – then use it without explanation. However, if you suspect many of the readers of your thesis may not be that familiar, then on the first usage spell the phrase out with the acronym in brackets. For example, “the Motion Picture Experts Group (MPEG) standard for image compression …”. From then on, just use the acronym. If you are using a lot of such acronyms – that can

occur if you need to discuss a standard – then put their definition in a nomenclature and use the acronym alone in the text.

8. Make sure that an acronym really is an acronym. For example, radar began as RADAR (RAdio Detecting And Ranging) because it was an acronym, but now it is written in lower case because it is accepted as a noun. More recently, SOAP (Simple Object-oriented Access Protocal) became just Soap because the protocol is not simple and it is not just object-oriented. However, the acronym served a useful purpose so it was decided to use the noun in the same context,
9. It should not affect most students, but there can be some extreme complications with acronyms. To illustrate two. SAR can mean Synthetic Aperture Radar and so can be viewed as a double level acronym. How do you handle this? In most cases, you assume most readers would be aware of 'radar' so only define SAR. A second is much more troubling. In electronics, DFT would normally be taken to mean 'discrete Fourier transform', but another very common use is 'design for test'. In this case, you need to ensure the context of the text makes it clear which you mean and you probably need a nomenclature to make clear the meaning to which you are referring (except if this is the only confusing terminology).

The second problem other than tense in a thesis is punctuation. English, like all natural languages, is ambiguous. This can be exploited to great effect in literature, especially poetry, to stimulate the imagination. Technical writing, though, is attempting to precisely communicate. So, incidentally, are legal documents so they face similar problems to technical documents. Thus punctuation plays a critical role in these to reduce ambiguity. The problem is that even with the very best of intentions, that is not easy to do and even skilled technical writers do not get it entirely right. Read a few user manuals for devices like DVDs to see an illustration of this.

Some comments on punctuation:

1. There is no place for ! in a thesis or ? so there is no point discussing them.
2. A full stop ends a sentence. Make sure that is all it is used for and that the string of words is indeed a legitimate sentence. Make sure, too, that you use full stops appropriately particularly with regard to brackets. Consider this sentence. "John Logie Baird invented a mechanical form of television (and an electrically heated sock). " Here, the bracket contains an aside, but it is part of the sentence. Thus the full stop is outside the brackets. However, it is just as legitimate to write "John Logie Baird invented a mechanical form of television. (He also patented an electrically heated sock.) " In this case, there is an aside, but it is a sentence in its own right and the aside is now a component of the paragraph. Thus the full stop is now inside the bracket.
3. There is much discussion in literary circles on the role of the colon and semi-colon. However, in technical communication they have some very specific roles. A very simple one is where you wish to quote. In this case, you would write something like "and as stated by Murfett and Brown:" followed by the quote. The more common use, though, is in listing. Listing is very common in technical communication as it highlights and makes for easier reading. There are two forms of list. A sentence with a set of elements separated by commas can be more effective as a list. For example, "The standard high fidelity amplifier comprises:
    1. one or more pre-amplifiers;
    2. a control stage setting balance, filtering and so forth;
    3. power amplifiers for each channel."

    Note the punctuation here; a colon to start the list, each element finished with a semicolon and the last with a full stop and there is no capitalisation as these are clauses of the one sentence.

The second form is where each of the listed items is one or more sentences. To illustrate, “The standard high fidelity amplifier comprises these elements:

1. A pre-amplifier for each of the channels from devices like tuners or CD Players. These may be divided into two to save costs.
2. A control stage. This is usually intended to allow the setting of balance, to filter noise or to compensate for the frequency response of the listening space.
3. A power amplifier for each of the stereo channels.”

Note the punctuation here and that the list items are proper sentences. By all means follow another standard, but to stress again make sure whatever approach you adopt is consistently applied throughout your thesis.

4. One of the common confusions about punctuation is that it is intended to provide pauses into the text. That was true years ago when few could read and documents often had to be spoken, and it remains true for dramatic scripts. However, the actual use is simply to clarify meaning (which pauses do in spoken English). So, how do you use the colon “:”, the semi-colon “;” and what seems to be a related element, the space bar “ - “ ? If you are a native English speaker, you are probably best to avoid these. If you are not a native speaker, then you have probably done English grammar at some stage and so have a better idea on their use, but again treat them with caution.
5. In general in a technical communication, a colon is used to join two sentence fragments together. The second fragment, however, must be an explanation of the first. For example, “The most commonly purchased operating system for servers is Microsoft NT: the most widely used is Unix, but it is free.”
6. The use of semi-colons and space bars is very subtle. Therefore, discussion here will be limited to one application where the use of these is

also blurred by the possible use of commas and indeed brackets. For various reasons, a writer may wish to insert a subsidiary clause into a sentence. If that is just a word like “though” or “however” then it is delimited by commas. If a little more emphasis is required or the clause is larger, then these other elements might be used. For example, ”the standard amplifier; if indeed there can be considered such an entity; can be used …”. The space bar may be used in much the same way as indeed could brackets or even commas. So, which is the better to use? Without getting into a very detailed and literary discussion, it largely revolves about emphasis. The space bar tends to give more prominence to the clause. Brackets make it clear it is a minor aside.

7. If you examine a PC keyboard, you will notice they allow you to type the following characters; “’”. “,”, “`”and “”. These may all look similar, but are very different. Further, the comma at least has many different uses and is one of the most confusing punctuation elements in English.

8. Apostrophes are widely misunderstood. It is important to emphasis one of the most common mis-uses. “Its” is a possessive as in “the power amplifier has its own power supply”. “It’s” is a contraction of “it is”. Thus “it’s a hard life” makes sense, but “its a hard life” does not. The use of the apostrophe to show contraction was the first use and still widely used in literature or poetry as “o’er the silvery moon”. In a modern context, though, the apostrophe has two main uses, First, it shows possession as in “John’s book”. Second, it shows time or quantity as in “a week’s time” or “two metre’s length. Note the punctuation is to add ‘apostrophe s’. A problem that arises is when the noun – singular or plural - ends with an “s”. Here, place the apostrophe outside that last “s” as in “babies’ toys” or “Mr Jones’ car”for the singular. For the plural, it is ‘apostrophe s’. That can look peculiar – for example, “the Jones’s house” - and a distinct problem here is that there are quite a number of

exceptions. However, what needs to dominate your thinking is am I conveying what I mean? Thus if you think it looks odd, find another construction. For example, “the Jones’s house” can be stated as “the house of the Jones family”.

9. Commas tend to be a very misused punctuation element. The problem is people have a habit of putting them where they are not needed and ignoring the fact their purpose is to clarify. In technical writing, commas serve three main purposes. First, they are used to insert a subsidiary clause or word into a sentence. Why is it subsidiary? Because if it is removed it does not alter the sense of the main sentence. Second, they are used to list items. In this case, rather than the comma you could put in ‘and’ or ‘or’ and this would not change the meaning (but it would make the sentence look clumsy). Third, they are used before a conjunction. The conjunctions are:

    for

    and

    nor

    but

    or

    yet

    so

    Conjunctions link two phrases to make a sentence. Be aware that words like ‘and’ and ‘or’ may be used in roles other than conjunctions. To illustrate, consider this form of sentence that commonly occurs in technical communication “The theory is explained in Clavell and Gates, Carroll and Jones, or Kahn and Williamson.”. Please note that ‘however’, ’though’, ‘nevertheless’ and so on are <u>not</u> conjunctions, You use these words to provide some emphasis or stress, not to link phrases.

6.5.5 The written structure of the thesis

Theses submitted for research degrees must conform to the University's requirements. These are outlined in the University Handbook. Theses submitted to the Department – Bachelor of Technology, Bachelor of Engineering (including double degrees) and coursework masters degree must include these elements:

Title page

Documentation sheet

Synopsis

Submission letter

Acknowledgements

Nomenclature

Index

Body of the Thesis

Bibliography

Books, journals references, web references.

Appendix 1

The project plan and amendments

Other Appendices

Implementation details, overview of standards (if relevant)

It is expected the body of the thesis would contain these elements:

Introduction

Justification of the problem and the application of solutions

Overview of the solution proposed

Statement of personal achievements

Thesis outline

Background

Critique of current practice.

Review of the theoretical issues (and others) relevant to the problem (where appropriate)

Detailed problem definition and solution requirements.

Problem solution

Overall and specific arguements indicating how and why the solution has been identified or chosen. This is to refer to appropriately presented supporting data such as graphics, tables and so forth.

Implementation

Overview of the implementation or simulation of an implementation

Verification

Outline of the means devised to verify the solution meets requirements and the results achieved from that verification process.

Conclusions

Critical analysis of the outcomes.

Outline of future development, highlighting particular areas for concern.

The elements of the structure are as follows:

1. TITLE PAGE

   This must be the very first sheet in your thesis and is a standard sheet available on the Project web site that includes a letterhead. On it you must type your thesis' title, your name and the degree for which the thesis is being submitted as shown. Your title needs to be chosen in conjunction

with your supervisor, but in essence it needs to be built about the principal keyword that best describes your project. It is to be like:

A Study of Pseudo Random Binary Sequences

by

Joseph P.B. Jones

A thesis submitted for the degree of

Bachelor of Engineering in Electronic and Communications Engineering

2. DOCUMENTATION SHEET

Blanks are obtainable again from the Projects web site. You need two copies; one to bind within the thesis and one to be handed in separately. The various sections must be typed as per the cover sheet. These sheets are eventually published by the Department in an index of theses produced within the Department each year.

3. SYNOPSIS

This is a single paragraph, on very rare occasions perhaps two, that briefly expands on the title like an abstract of a published paper. For example:

> *A programmable pseudo random binary sequence generator has been constructed for the testing of communications circuits up to video frequencies. The unit may be programmed for both bandwidth and sequence length and, if desired, with a programmable DC offset.*

The synopsis is not a summary of the project; that is provided elsewhere. Rather, it serves two purposes. The major one is to highlight what you see as your major accomplishment in completing this project. The second is to draw the reader in by, in effect, providing an explanation of the thesis title via more detail. Hence it would be expected your synopsis would include the main keywords you see that pertain to your work.

4. INTRODUCTORY LETTER

This is a formal letter to the Head of Department. Begin with your current address and a date. (Do get the name of the Department and the Head's name correct.) You need to make two statements.

First, you offer the thesis as partially satisfying the requirements for the particular degree concerned so repeat the name of that again. Note it is partially satisfying as you have to pass a number of units other than the project units to graduate, and even within the project units themselves there are other assessment components.

Second, you **MUST** state this thesis is entirely your own work outside of where acknowledgement is given. You must sign this letter.

5. ACKNOWLEDGEMENTS

Acknowledgements are a formal component of the thesis to identify any assistance directly given to you in undertaking this work. That is to say, that assistance ensured the thesis could be presented. That means in general terms you only cite:

1. your Supervisor, if only so we and others know who it was;
2. any member of the technical staff who offered special assistance;

3. anyone who helped you (for free) in the typing of the thesis or production of figures;
4. anyone who edited your thesis and corrected your English;
5. the name of any Scholarship provider who supported your studies;
6. if you received time-release from an employer, then that employer;
7. if an industry project, who was the sponsor;
8. if a company donated all parts or other services, then who they were.

What you do **NOT** do is thank parents, friends, your church, God, spouses, your local pizza delivery service, your housemates and so forth. Their support may have been psychologically rewarding or expected, or more a case of tolerance. However, nothing they did or did not do would have made this thesis different. A thesis is not a book and acknowledgements is not a section for a dedication.

6. NOMENCLATURE

This is an optional section. **ONLY** if you use a large number of unfamiliar symbols or acronyms, then list them and their definition. Nomenclature is provided as a courtesy for a reader. It is placed at the front of a thesis because that makes it easier for the reader to check it when reading.

As a general rule of thumb, only include a nomenclature page if you have at least a page of symbols or acronyms unfamiliar to your expected readership. In the above, for example, the author might have listed:

$\Phi(N)$ Euler's totient function

$\omega(N)$ The number of distinct prime divisors of N

$\pi(N)$ The prime number distribution function

as these are unfamiliar to most electrical engineers. Remember that the key readers are the examiners. Listing frequency, impedance, TCP, IP, and such like is just offensive.

7. INDEX

List the chapters in order with their headings, all sub-sections with their headings in that chapter, all the sub-sub headings and so on. In each case, list the page number on which they are found. Note the format of the index in this guide; it is exactly in the format required. On the following page, list all figures and tables with their page numbers.

8. INTRODUCTION

This is the first actual chapter of your project and as mentioned earlier, it needs at least three subsections.

Section 1.1 presents the 'big picture' and justifies why a project like this is important. This is usually of a form (although this is quite abbreviated) like this:

> *The potential impact of terrorist acts requires a much higher level of vigilance at many public sites. However, this cannot be provided for economic and other reasons simply by extending the security forces. A means of solving this problem is by automated face recognition systems. Unfortunately, these work poorly in low contrast environments or where much of the face is hidden. This thesis examines the problem of object detection in low contrast images.*

It is also appropriate at this point to comment on possible applications of the project, especially in an undergraduate project.

For an undergraduate project, it is enough to establish the broad need for the solution. For graduate theses, the justification needs to become stronger. Thus the implication is why did this problem need to be solved, not just that it could. For research theses, this is extremely important.

Section 1.2 of the introduction is a formal requirement of the thesis. You need to identify what is the novel or important feature of your work. That is, what are you claiming as the intellectual achievement of the thesis. Note that. It is not what you actually created, but what you are claiming is particularly noteworthy about how you went about it. For a graduate thesis this is particularly important. This part would be along the lines of:

> *A solution to the problem of XXX has been found by combining YYY's proposal with ZZZs. A simulation has demonstrated the value of this unification.*

While this is a formal requirement, you should also attempt to 'wet the reader's appetite' and briefly outline the good things to come. These are, of course, your achievements.

Section 1.3 is also straightforward. It simply outlines exactly what is in the thesis and so points to where these good things lie.

Are there only to be three sub-sections? In general, yes but this is not fixed by any means. For example, if a project was to develop an electric vehicle and this was going to be entered into a competition, then it would be appropriate to have another section describing the competition and perhaps even the outcome. It is a question of judgement.

9. BACKGROUND

This is a critical part of any thesis. Do note that in some circumstances - mainly graduate - two or more chapters may be needed. There are also some very rare circumstances where no background chapter is needed.

The background section is one of the most misunderstood sections of a thesis and so some explanation of its rationale and what should be in it is needed.

Why it is needed is easily explained. Every technical problem has a background of some form. Various people will have either examined the problem before, thus there will be a range of tested solutions, or they will have contributed to parts of the problem as in research topics. You need to find that knowledge and understand it. Then you write that understanding as a chapter (or perhaps two) of your thesis.

Note that. It is not a tutorial; it is a justification. You are stating by writing this section that any solution you propose should be treated seriously because you understand what you are doing. The way you write this section will indicate what you see as important, what you see as the important developments, what you see as being the key tools and concepts needed to solve the problem, and so on. Thus this needs to be a tightly written section with many references.

There is one small variation to this. Occasionally, you might find some theory or knowledge that is not widely known to the readers of your thesis but critical to it. For example, a mathematical theory such as elliptic curves in number theory. Alternatively, if you are developing a modification for an instrument used in spectroscopy, then you might see it as important to discuss spectroscopy. This is far more likely with a graduate thesis than an undergraduate. Then you might like to have a chapter to develop that. Again, though, it needs to express your understanding; what influences your actions and why.

10. YOUR WORK

In the next few chapters, you outline clearly and logically the work you have performed, together with all test results. Try to present this in the sequence the problem, a solution, verification of the solution.

11. CONCLUSIONS

Conclusions is always the final chapter of a thesis and again a very critical part. Again, it is widely misunderstood section. A point to stress is that this chapter is not a summary. Conclusions means an intellectual analysis of your work, assessing both strengths and weaknesses, and the implications for those that follow you.

An important part of conclusions is discussing the question "where to from here". You are now thoroughly expert in this problem and so you are now in an excellent position to nominate the way forward. This is an important intellectual contribution you can make and your reasoning will demonstrate your abilities very well.

12. BIBLIOGRAPHY

The Bibliography is treated as chapter and follows the conclusions. While it is numbered as a chapter, it has no text and no sub-divisions. You can call it references if you wish. It is a list of books, journals, reports, white papers and so forth that **MUST** be referenced in the body of the text. This is **NOT** a reading list.

Referencing is not trivial. See the later section on this for further details.

13. APPENDICES

Appendices serve several purposes. Their main reason is simply to report information that needs to be reported, but which is of secondary importance. For example, a lengthy mathematical derivation or a test procedure. To include it in a chapter would only distract the reader. There is also information that needs to be reported, but which has no real place in the body of the thesis. For example, operation manuals for equipment you have developed, large tables, component data, design formulae, summaries of standards and your cost estimation. Schematics, flow charts, software listings, PCB designs and so forth also belong in an appendix. Each appendix must cover just one topic, but there is no limit on the number of appendices.

It is difficult to imagine a project report without appendices. In the case of a hardware project, at the very least you should include your cost estimation and parts list, plus a full schematic of the system developed. For a software project, a definition of the environment used (operating system, its revision, compiler and its revision) plus the code listings.

You **MUST NOT** include data sheets in appendices or other copyright materials. Unless you have the express permission of the copyright holder to reproduce them, you are in violation of the copyright act. If the University puts your report on public display, then it is held responsible. Under this circumstance, any inclusion of data sheets without evidence the copyright holder has given permission for reproduction must result in an automatic F grade. Even where permission is gained, why they should be included? If they are readily available in Handbooks, then there is no point. If it is a very unusual component then give a concise summary only

6.5.6 Numbering in thesis

Numbering in theses is a topic that confuses many students. There are four key topics to discuss here:

Numbering of the text

Numbering of equations

Numbering of figures and tables

Lists

A key feature of a thesis is that chapters and sections are numbered and have a tile. The number of theses that do this incorrectly is a cause for some exasperation within the Department. Please note this Guide uses the required format. You may also note it differs slightly to that used now by the I.E.E.E. in its publications.

The numbering system is very simple indeed and very logical. A thesis is simply a very large piece of text. That is unmanageable. Therefore, it is broken down into chapters and each is numbered (and labeled). The chapter numbers are of the form 1.0, 2.0, 3.0 and so on. Now if there is any sub-division of those chapters, then each of those sub-sections is also numbered (and labeled). Thus if chapter two is sectioned, its sections will be numbered 2.1, 2.2, 2.3 and so on. Again, if any of these sections are sub-divided, each in turn is numbered. That is, for example, 2.2.1, 2.2.2, 2.2.3 and so on. Do not consider any further sub-division than this. If you do, you are virtually numbering paragraphs and that is ridiculous.

There are several reasons for numbering in this way. It is logical and neatly divides information into appropriate sections. That encourages the writer to create a logical work. It also makes it easier for a reader to locate information. Unlike a book, a thesis does not have a topic index at the rear. However, numbering sections and chapters, and having an index at the front makes locating information quite easy.

Every piece of text in a thesis has at least one number and label associated with it and it can contain up to three. Consider the following part of an index:

2.2 Chroma Lock

2.2.1 Overview

2.2.2 Principles of Chroma Lock

2.2.3 Advantages of Chroma Lock

2.2.4 Disadvantages of Chroma Lock

Some minor points to consider first. Under ALL circumstances, a heading such as 2.2.3 is indented within the index and within the body of the report. Under NO circumstances is text indented, especially the start of paragraphs.

What does this index fragment imply about the text? Consider again the process of division. Then this fragment means that section 2.2 discusses Chroma Lock as a whole. That is to say, in spite of the sub-divisions that might exist, that is the topic of this section. Now in this case there are sub-divisions. The implication therefore is that each discusses a specific topic under the general heading of chroma lock. The first, 2.2.1, presents the overall picture and implies why this subdivision is chosen. It is an introduction to this section as a whole and there is absolutely no reason why it should not be called that. Clearly, there is quite a distinction between the chapter '1.0 Introduction' that introduces the thesis as a whole and '2.2.1 Introduction' introducing discussion on chroma lock.

Given this division, then if you look up the section within the thesis, what you do not expect to find is text between the label 2.2 and the label 2.2.1. Rather, just as in this guide, what you should expect to find is something like this:

2.2 Chroma Lock

2.2.2 Overview

Chroma lock is one of many techniques for decoding the chrominance signal in colour television. Its salient features are. . .

The reason to stress again why you expect to see this is quite simple; 2.2 is the overall section and 2.2.1 is one of the text blocks which constitute it.

The numbering of equations is a little vexed. In general, you only have to number equations if you intend to reference them. Thus in a derivation, you would normally number just the final result, not the intermediate terms. However, again if you intend to reference one of those terms you may number it. Equations are numbered in the form 2.1 meaning this is the first equation referenced in chapter 2. Equations are numbered from 1 to the final equation in the chapter.

Numbering of figures and tables follows a similar style. If a figure appears in chapter 2, then it is figure 2.x. Simply number them from 1 in the order in which they are quoted in the text. Tables are numbered in the same way. Text, figures and tables are not linked when it comes to numbering.

The convention in a thesis is that there is a separate index for figures, then tables if you have them, but not equations. Do note that each figure and table is to be numbered in the form “Figure 2.1: *title*”. That title should clearly state what the figure is about. Now you may have taken this figure or table from a reference work, or plotted the data from a table elsewhere. In that case, where the figure or table appears in the text, put in brackets after the title the reference and whatever appropriate terms you see fit. For example “(Taken from Jones et al, 1991, but plotted against logarithmic time).

There are often circumstances where you may wish to list items. In general, only list if you have words or one or two sentences to describe the items of the list. If you require more than a paragraph or two, then you probably need to go to a third level of the section concerned. The list itself must be numbered. The format required is basically:

1.
2.
3.
    i
    ii

If you need to go to greater depth, then re-structure.

6.5.7 References

Curtin uses a modified Harvard format for references and this applies to all Curtin publications, reports and theses. Details can be found at:
http://lisweb.curtin.edu.au/reference.
This format is a little limited with respect to electronic referencing. If you have some concerns in this regard, then use the APA (American Psychological Association) method for electronic referencing. Details can be can found at the same web site.

A brief summary of the format. In the body of the text most references are one of:

1. (Jones, 1991)
2. Jones (1991)
3. Jones (1991a)
4. Jones et. al. (1991)

The first means Jones alone is the author, 1991 was the year of publication and that in your referencing you are more focused on the method or the outcome that Jones reports than you are in Jones as a person. The second means the same, but now it is important to mention Jones' name. In the third, Jones was again the author, but that there may be several Jones in your bibliography or that Jones has published several

times in the one year and you list several of those works. Hence this is stating the Jones you are referring to is the first reference under Jones for the year 1991 in your bibliography. Finally, the last form means there are several authors of whom Jones is the first. How to use these forms? Some examples:

1. "The formula for this is (Jones, 1991): "
2. "The standard reference for this work is Jones (1991)."
3. "Jones (1991a) showed that... and then later (Jones, 1991b) "
4. " The work of Jones at al (1991) was a turning point in the field…"
5. "It is easy to show (Jones et al, 1991) that .., "

You do not have to repeatedly reference if your text makes it clear you are still drawing on the one source. Use 'ibid' as appropriate.

The situation with multiple authors is a little complex. The convention is that two authors are always quoted. If there are more than two authors, then the first time you quote them you use all their names as in "Smith, Jones and Leeman (1991) give an alternative...", but from then on "Now it follows (Smith et al, 1991)"

Referencing can get a little complicated. You are doing a project with Western Power and one of their senior engineers tells you that you should do something is in this particular way. Alternatively, you contact someone about a part and they give your vital information not listed in the data sheets. Here, someone has provided a specific service applicable at only one point of your project and it is quite detailed. It is not really appropriate to mention them in Acknowledgements because you want to refer to that specific item. How do you state their advice/opinion/service? The answer is exactly as for any other reference, but now in the Bibliography, list:

Jones, R.B.(1991) Personal communication

You do not have to be more specific than that. Note that the **ONLY** time you quote spoken words is when they are a personal communication or when the speech is archived in some public domain archive. You do not cite hearsay.

What happens if you access a reference such as an industry white paper where no author is stated? If the paper is issued under the name of a company, make that the reference. Otherwise, it is clearly a publication of that very famous author Anon.

The Bibliography is obviously important. It must be alphabetically sorted according to authors name (and initials if there are several with the same name). Again, note the Library web site for details, but in summary the requirements are as follows:

1. For a Journal articles, the format is:

   Langmuir, I. (1919a). The arrangement of electronics in atoms and molecules. J. Am. Chem. Soc. , 41, 868-934

   Langmuir, I. (1919b). Isomorphism, isoterism and covalence. J. Am. Chem. Soc. , 41, 1543-1559

   Note here the use of commas and full stops. Also that the title is expressed as a sentence and the Journal name is underlined. The title is expressed in abbreviated form; the standard abbreviation used. The number following means the volume number. Do not include the month, but if it is publisher's convention to highlight the part, then include that. (That is, the publisher produces each issue starting at page 1. This is rather unusual.) Finally, there are the page numbers.
2. For books, the format is:

   Mullin, M. (1989). Object oriented program design, 1st edition. Addison Wesley.

Note the underlining of the title. If you wish to refer to a specific part of the book or if it is a compilation, then the format is:

Mullin, M. (1989). Object oriented program design, 1st edition, chap. 7, pp. 127-130. Addison Wesley.

Wake, W.C. (1961). In Adhesion (ed D.D. Eley), chap.8, pp. 191-206. Oxford University Press.

3. For a thesis, just state "Ph.D thesis, University of California, Davis" instead of the publisher.
4. If you need to cite a reference, but you cannot locate it to verify its contents, then what you should do is something along the following lines:

Mullin, M. (1989). Object oriented program design, 1st edition, chap. 7, pp. 127-130. Addison Wesley. Cited by Stevens, A. in Dr Dobbs Journal (1989), 8, 240.

5. If you wish to reference a databook, then it is like:

Texas Instruments (1986). TIBPALR19L8, TIBPALR19R4, TIBPALR19R6, TIBPALR19R8 high-performance registered-input PAL circuits. The TTL databook, vol.4. Texas Instruments Inc.

6 For company reports, etc., then use 'Internal Report' or 'Unpublished Report' as appropriate.
7. Web-based materials present quite a problem. One difficulty is that web URLs can frequently change. Therefore, a standard method of referencing is to follow the above format, but to include at the end at least:

Downloaded from 'URL' in July 2004.

Many University sites – and indeed others – have another defining name. For example, they are the Department of Electrical Engineering, or the Systems research Institute of that University. If this is the case, then cite that as well. The objective here is to give the reader enough information so that they can locate the article or whatever through a search engine if the URL should change.

A serious problem is that much web material is not peer reviewed and so academically suspect. Hence you need to treat it with some caution.

There are now many different web sources. For example, databases, discussion forums, downloads, web pages and so on. Examine the standards listed at the earlier web site just to confirm what you should do in each particular circumstance.

6.6 Theses for projects that are software-based

You may be doing a project that in part or whole is concerned with software. Some students become confused on how to write a report in these circumstances. However, it is really no different from any other thesis.

Some general comments:

1. Software specifications often relate to form. That is to say, this is what a GUI will do when the user does this particular action. This will often be part of the overall design process. If so, then you may need a separate chapter to describe this part of your design, or indeed any other software architectures you have developed.

2. Software does not just happen; it is engineered. You choose or devise algorithms, then you determine data and control flows in some way. Then the body of the thesis describes these intellectual activities you undertook and why you made the decisions that you did. That may require you to discuss some code fragments, but that is all. The full source code is really of limited interest and so would normally be placed in an Appendix. Note that for code you can use 10 point font, you may use a different font to the main thesis and you do not have to make this text double spaced. It should be source code as you produced it.
3. The software has an implementation - the code - in a particular language – C, Java, Lisp, Perl, Python, Eiffel, APL, Beanshell or whatever - it is targeted at a particular operating system and it may also be targeted at a particular GUI interface such as X-windows or Cocoa. You need to indicate the reasons for your choice of these in the body of the text.

6.7 Graduate Research theses

The requirements for research theses are listed in the University Handbook and are different to the above in certain key details. In addition, please note the following:

1. There is no letter or documentation sheets.
2. As mentioned, the background chapter is vital in a graduate thesis and almost mandatory. Unlike an undergraduate thesis, its purpose is to show a very thorough literature survey of the field and an ability to critically analyse in some detail.
3. The thesis itself will be bound by the Library only after your thesis is accepted. Prior to that, it is given a temporary binding only. Again, you are required to pay for this.
4. You are required to submit multiple copies of your work. See the University Handbook.

6.8 Attachments to the thesis

Many students may wish to include very large data sets, images, animations, simulations, copies of software and so forth in their thesis. Three comments on this.

1. Please place this information on a CD/DVD not a floppy disk. See IT support if you need assistance in this.
2. Please include an appendix to describe the contents of the disk, the software used to prepare them, the recording format (as a thesis is held for a very long time) and also to which operating systems it is compatible.
3. Most importantly, please fix the CD/DVD in a pocket in the back of the thesis folder.

6.9 The electronic copy of your thesis

You are required to submit an electronic copy of your thesis. Then:

1. Please supply this on a CD or DVD. See IT support if you need assistance in this. The disk is to be Windows and Linux compatible.
2. Label the disk with your name and the year. Put a physical label on it – not a sticky label, use a permanent pen – and put a small Readme file on the disk itself with your name, student ID, email and postal address.
3. The text should be in the current version of Word (available on all Departmental machines.) DO NOT PROVIDE IT IN PDF OR OTHER FORMATS.
4. The CD should contain an exact copy of your thesis. However, if your hard copy also includes a CD, your may, if you wish, include that directly into your appendices. In this case, please attach a note to the text indicating that in the hardcopy this material is a separate CD. Otherwise, please supply an image of the CD as a separate folder on this submitted CD.

7.0 ASSESSMENT OF THE PROJECT

7.1 Introduction

Educationalists recognise three main forms of assessment:

- *Reflective assessment* is designed to help you judge your own progress. That is one reason for the project plan and the project workbook. Further, this Guide is designed to assist in your reflection and so will the archive of past theses.
- *Formative assessment* is designed to assist students and their instructors judge progress, issues limiting progress and so forth. In the case of project, formative assessment is provided by the regular meetings with your supervisor and also your workbook. The presentation of the draft is also an important part of formative assessment.
- *Summative assessment* is where a determination is made on whether you have met the unit outcomes. That is achieved by assessing your seminar and examining the thesis and that is the major topic of this chapter.

Do note the role of these other forms of assessment and the fact they are important.

Assessment in project units from 2004 onwards has been changed for a number of reasons. One reason is to make the process far more transparent than in the past. That means you should have a very clear understanding of what you need to do to gain the grade you wish. A second reason is to make it more fair. An obvious problem with project is that every student has different examiners so how to ensure each student is awarded the grade they deserve. The new scheme addresses that.

Project work is a little unusual in that although it is one task, for most students it is undertaken as two units. The following needs to be noted:

1. In both semesters, you first must meet a checklist of requirements before you will be assessed. If you do not meet the checklist, you automatically fail and are given a DNC result.

2. There are no supplementaries awarded in project units given they are supervised. There are also no deferments granted given that time management is an important outcome.
2. For the first semester, you will receive either P or F. P means that you are keeping to the plan as agreed between you and your supervisor. Therefore, your progress is satisfactory. F means it is not.
3. For the second semester, assessment is very holistic. That is, your seminar and thesis are judged against broad criteria. You cannot receive a high grade merely by focusing on, say a particular part of the thesis.
4. For a Bachelor of Engineering degree, the grade students receive in the second unit will be assigned to the first semester unit when calculating a course weighted average to determine honours.

7.2 General requirements for projects

7.2.1 Enrolling in project units

To reiterate points made elsewhere in this guide:

1. You may not enrol in project units unless your course coordinator approves. In general, that approval is only given in an undergraduate course if you have completed the equivalent of three years in the engineering program or two in the Bachelor of Technology. In rare circumstances, you may be permitted to begin project after five semesters in the engineering program or three in the Bachelor of Technology.
2. Your enrolment is treated as conditional. Unless you have submitted a signed Patent declaration Form and an approved project plan, by the HECS cut-off date, your enrolment will be cancelled.

7.2.2 The first semester checklist

In order to be considered for assessment in the first semester, you **MUST** do the following:

1. You must not have breached any laboratory rules of the Department or regulations of the University, particularly relating to copyright and IT.
2. You must have meet regularly with your supervisor. As evidence of this, there needs to be a page in your project notebook indicating meetings and signed by your supervisor.
3. You must have reached the objectives stated in your most recently approved project plan. That is to say, your original plan plus approved changes. You must have demonstrated in some way that you have reached these milestones.
4. You must have submitted your project notebook before 4.00 PM on the last Friday in the last teaching week of the semester to your supervisor for inspection.

If you do not satisfy any of these, then you will achieve an F grade. You will receive a pass grade (P) otherwise subject to the contents of your project notebook.

7.2.2 The second semester checklist

In order to be considered for assessment in the second semester, you **MUST** do the following:

1. You must not have breached any laboratory rules of the Department or regulations of the University, particularly relating to copyright and IT.
2. You must have delivered a short seminar on your project topic.
3. You must supply a completed Clearance sheet showing you have returned all borrowed materials and that your supervisor agrees that your thesis be presented. The latter means you **MUST** have presented a draft.
4. You must submit to the Department office before 4.00 PM on the last Friday of the last teaching week of the semester:
   - i one bound copy of your thesis in accordance with Departmental requirements;

ii a second unbound copy in any protective folder you wish (and which will be returned to you);

iii an electronic copy (preferably on CD) with your entire thesis upon it, again in accordance with Departmental regulations;

Please note your thesis will be checked to ensure it meets the standards described in this Guide. If not, it will be returned to you for correction. Thus this submission date should be seen as a final date rather than the actual submission date.

7.3 Patents and Copyright

Since you are using University property in working on your project and as you are under the guidance of a University employee, then anything you develop that may become a patent or registered design is the property of the University. Under University regulations, you must sign a declaration to this effect and submit it to the Projects Coordinator or Department office before the HECS cut-off date. If you do not, your enrolment will be cancelled. The only exception to this is for those students who have an approved industry project. In that case, what is decided between you and that organisation over these issues is entirely your affair.

Needless to say, patents are hardly an issue in undergraduate projects. In fact, the Department has never had one issued to a student. However, it is a legal requirement that you sign the Patent agreement before you commence the project. Legally, if you do not and then later file for a patent, you are in breach of the law and the University can sue for all the proceeds you gain. You will, of course, also have to pay your own legal fees and in patent cases they can be high.

Your project thesis shows the state of development you reached. You can proceed to further develop the idea either on your own or with industry support after graduation. You are strongly advised to ensure your records show a clear separation between these later activities and your student days if you think a patent is likely.

If you believe you have developed a patentable idea, then what do you do?. The first step is to ensure that it is patentable. So, some brief comments on patents and copyright. Both are measures to provide protection for intellectual property (IP), but are quite different in their thrust and utility. Copyright largely applies to a given instance of something. For example, a musical composition, a piece of literature or a particular graphic used in advertising. You copyright that particular instance as it is important, and clearly changing the sequence of notes or the words, or re-arranging the graphics largely creates something very different. The law actually specifies how different something must be for you to be in breach of copyright to ensure any change you make to try and avoid the original holder's IP is defeated.

Copyright also applies to paintings and graphics. That also means house plans for example. However, consider a schematic. You can copyright this if you wish – and many companies do. Copyright, because it deals with an instance, only requires you to declare it and there is no registration process. (There is, though, for trademarks.) In the case of a schematic, though, what is important is not the drawing itself, but the intellectual process you went through to arrive at that. It is your approach that is the IP, not the end result. This is where patent law applies.

A patent is a legal agreement with the state. In return for you disclosing how you achieved some useful end, the state gives you a monopoly for a fixed time to exploit your invention. You have exclusive rights to produce that invention, sell it, licence it or whatever. You can effectively create a world patent if you wish as various agreements between the key industrial nations effectively permit this. If at the end of the patent licence period, you earned very little but it is clear your invention is very useful, then you can gain an extension. The best-known example of this was Sir frank Whittle's invention of the jet engine. Due to World War II, he was not able to exploit his invention effectively and so was given an extension.

A patent has to express novelty. To express some legal parlance, a patent cannot form part of the common knowledge. What that means is a typical skilled practitioner who could implement your invention would not be aware of what you have proposed and would not have followed your course of action in their duties. An implication of this is that the invention cannot be described in part or in full in any publication such a skilled practitioner would be likely to read prior to filing the patent. Hence the importance when filing a patent to undertake an extensive literature search.

The awarding of a patent simply means the patent application meets legal requirements. It does not mean the government believes the invention is useful or that it can be created or indeed is unique. Only one type of patent application is automatically rejected – for any form of perpetual motion machine – and others if rejected are done so purely for legal reasons. Once letters patent are awarded, they can only be rescinded if a court declares the patent to be invalid. Patents are listed in a gazette prior to the letters being issued and at that time objections can be raised.

The protection patents offer is often overrated. It is quite easy to circumvent many of them or prove they are invalid. In rapidly changing areas like electronics, patents are most valuable for fundamental processes such as semiconductor manufacture. Nevertheless, a patent holder can cause considerable damage to an organisation before a final ruling is made on infringement or whatever. To illustrate, to prove a patent has not been violated the design process can be revealed. However, this information cannot be kept *in camera* until a superior court is reached, and that makes costs very high.

If you believe you have a patentable idea, then your proposal must be submitted to the University's Patent committee who will then decide to proceed or not with the patent or design. If not, then you will be offered the patent and you may proceed independently. If the University does pursue the patent, then you will be given a royalty of between one and two thirds of all proceeds raised after costs.

There is no imposition or unfairness here. The University pays far more of the royalties to you than is common in industry. There, you might get a Xmas bonus and first choice at the plum projects, but that is usually all. Mostly what you get is prestige. In addition, if the University does decide to file and then exploit a patent, it will pay the legal and other costs. Given its contacts, it can do a much better job in selling than you could, or indeed most companies you approach could, thus your patent gets a better return than it might otherwise. Further, if additional work needs to be done, then the University would almost certainly hire you as the consultant. Thus on the whole, the University's approach is an attractive one.

You should note that paying for your own components does not mean you gain patent rights. The key legal condition is that University facilities were used to generate the patent, which means space, resources and consultation with staff. Thus paying for your own components simply means you may keep the physical project.

Avoiding these patent requirements is only possible if you do an industry project. A ruling by Council has declared the University waives all of its rights in this regard.

In the case of research graduate research theses, there is technically no such thing as an external project. Equally, because it is more likely such a thesis would produce a patent, the University is a little stricter in its approach. It is now standard throughout Australia that any patents produced by research students belong to their University.

Legally, you have copyright over your thesis as you produced it. However, you have submitted it to the University as a course requirement knowing the University intends making that a public document. Thus you are effectively assigning the University the right to copy as often as it desires for non-commercial purposes. Part of what the latter means is that if you believe you can produce a book from your thesis, then you may proceed and the University will make no claim against you.

7.6 Public disclosure

As mentioned, your project is a public document as far as the University is concerned and so available to anyone who wishes to read it. If the project is sponsored, then a problem can arise as discussed in section 2.4.

It follows from this that theses cannot be stamped with 'Confidential', 'Commercial In Confidence' or any other such labels, including incidentally 'copyright'. Apart from the fact they make the thesis non-standard and so unacceptable, those provisions have no legal force and will not be accepted. Similarly, any restrictions on distribution will not be accepted. Unless a company issues a formal request for some waiver to the Department, it is taken they are in full agreement with the Department's policies with regard to projects.

7.7 Assessment in the first semester unit

Who assesses your work in the first semester? In a technical sense there are two examiners. Your supervisor is required to submit a marking sheet that lists the checklist given earlier. That same sheet asks whether you should receive P or F. The Projects Coordinator is the unit controller and so ultimately responsible for results. In this case though, the Projects Coordinator will simply check you have met the objectives stated in your plan and otherwise accept your supervisor's advice.

7.8 Assessment in the second semester unit

7.8.1 Introduction

Assessment in the second semester unit of project is based on the following:

1. You must meet a checklist of requirements.
2. If you do, then a grade will be determined where:

   15% of this is derived from your seminar

   85% is derived from your thesis

Both your thesis and seminar are graded according to broad criteria derived from the AVCC (Australian Vice Chancellor's Committee) recommended criteria for assessment. That determines an initial band for your final grade. What you have actually done will then be closely examined for any meritorious elements, and then a final grade determined.

Your seminar is assessed by a panel of at least three people, but it can be more. The average of their results is your final grade. Your thesis is examined by your supervisor and another person who has some understanding of what you did. Usually, that is a member of the academic staff but it can in some circumstances be an external person or a visitor to the Department.

7.8.2 The seminar

As mentioned, your seminar is first assessed to a particular band of grades according to global criteria. In order to be considered for a given band, you **MUST** meet all the criteria listed. Those bands may be taken as follows:

High distinction: Grade 85-100

1. Overall, a seminar of exceptional quality showing a clear understanding of the subject matter and a strong appreciation of related issues.
2. The presentation medium was well-balanced and helped the audience grasp the major points. Slides were clear and uncluttered, and easily viewed.
3. The problem was well-presented and its importance made clear.
4. The key points in the solution were appropriately highlighted and explained.
5. Significant engineering judgement seems to have been demonstrated in reaching that solution and it seems the most appropriate.
6. The organisation of the seminar was logical and flowed smoothly. It was clear this was a well-planned activity.

7. The oral presentation was given in a clear, confident voice speaking to the materials presented
8. The presenter made appropriate contact with the audience.
9. A good summary was made of the work done.
10. The seminar was within the time allotted.
11. Questions were answered confidently and effectively.

Distinction: Grade 70-85

1. Overall, a seminar of quality showing a good understanding of the subject matter and an appreciation of the related issues, but occasional lapses occurred showing a failure to fully understand the needs of the audience.
2. The presentation medium was reasonably-balanced and helped the audience grasp the major points. However, some slides were cluttered, there were some spelling and grammatical errors, and some other flaws.
3. The problem was presented clearly and its importance made obvious.
4. Most of the key points of the solution were appropriately highlighted and explained.
5. It was evident that a good standard of engineering judgement has been shown in executing the work. The solution seems appropriate, but some small questions remain whether it was best solution available.
6. The organisation of the seminar was reasonable, but on occasions the speaker made assumptions on the audience's understanding of the work done that were invalid. Further, while it was evident the work done was to a plan, the plan was not quite as good as it could have been.
7. The oral presentation was given clearly, speaking to the materials presented.
8. The presenter made appropriate contact with the audience during most of the presentation.
9. A summary was made of the work done.

10. The presentation was within or just past the allotted time.
11. Most questions were answered confidently and effectively.

High pass: Grade 55-70

1. Overall, a seminar showing an adequate understanding of the subject matter and an appreciation of the related issues, but it often failed to take the audience's requirements into account.
2. The presentation medium was balanced although flawed in some elements and helped the audience grasp the major points to a degree. The multimedia could have been better such as by simplifying some slides.
3. The problem was presented clearly and its importance made moderately clear, but the emphasis could have been better.
4. A reasonable level of engineering judgement seems to have been applied. However, it was not clear why this solution was more appropriate than others although it clearly gave a good outcome.
5. The core of the solution were appropriately highlighted and explained. Work appears to have been done to a plan, but the plan itself and how the work related to it were not as clear as they could have been.
6. The organisation of the seminar was a little disjoint, but generally understandable.
7. The oral presentation was given reasonably clear, but the speaker occasionally reverted to what was clearly a pre-prepared speech.
8. The presenter ignored the audience for a significant portion of the time.
9. A slightly flawed summary was made of the work done.
10. The speaker clearly rushed in an attempt to finish in time or just past the time allotted.
11. A reasonable number of questions were answered confidently but some answers suggested the speaker did not quite grasp the issue put forward.

Marginal: Grade 40-55

1. Overall, a seminar showing a just adequate understanding of the subject matter and an appreciation of the related issues, but there were significant flaws in the presentation.
2. The presentation medium has some notable faults but most of the audience could at least grasp the issues. Elements such as the colour scheme and layout of slides did not seem to have been chosen with care.
3. The entire problem was not presented and its importance not entirely made evident, but the fact some effort had to be expended to solve it was clear.
4. A just acceptable level of engineering judgement seems to have been applied. The presentation tends to suggest that the first acceptable solution was adopted with no real thought given to other possibilities.
5. Most of the core of the solution were appropriately highlighted and explained. There seems to have been a plan to develop the work, but exactly how it figured in the operation is not very clear.
6. The organisation of the seminar could have been much better, but generally understandable.
7. The oral presentation was reasonably clear, but the speaker spent a significant portion of the time reverting to prepared notes.
8. The presenter ignored the audience for a significant portion of the time.
9. The summary made of the work done seemed a little confused.
10. The speaker clearly rushed in an attempt to finish in time, and as a result became a little obscure towards the end.
11. Questions were answered in a basic fashion.

Fail: Grade <40

1. Overall, a seminar with quite a number of significant flaws in the presentation.
2. The presentation medium has some glaring faults and many in the audience

could not grasp the issues. Slides were illegible and very cluttered.

3. The entire problem was not presented and little attempt was made to highlight its importance. It was not clear why the problem requires a significant effort to solve it.
4. There does not seem any evidence of engineering judgement being applied. The solution seems to have been found by adopting a similar one applied to another problem but with little understanding of the issues involved. There was clearly not attempt made to locate another solution.
5. The speaker spent much time on irrelevant issues. If there was a plan, it does not seem to have played much of a role in the work done.
6. The organisation of the seminar was rather disjoint and confusing.
7. The oral presentation was essentially given from prepared notes.
8. The presenter ignored the audience for most of the time.
9. No real summary was given
10. The speaker could not complete in the allotted time.
11. The speaker did not seem able to answer most questions.

Once your base grade is determined, then you will be awarded marks up to the top of the band according to how meritorious you were in given areas. For example, your seminar stimulated many questions and you answered them well.

7.8.3. Assessment of the thesis

Again, the same process as for your seminar applies. Your thesis is first assessed to a particular band of grades according to global criteria. In order to be considered for a given band, you **MUST** meet all the criteria listed. Note that these criteria assume a thesis in the format outlined in Chapter 7. There are also some slight variation depending on the degree for which you are submitting the thesis. Then the bands for assessment of Bachelor of Engineering theses may be taken as follows:

High distinction: Grade 85-100

1. Overall, a work of exceptional quality showing a clear understanding of the subject matter and a strong appreciation of the related issues.
2. There is evidence of strong intellectual ability with arguments sustained.
3. There is a balance to the work with appropriate emphasis given to the key issues and a structure that binds them together well.
4. The need to solve the problem is well justified.
5. A critique showing great insight into the problem, and the means by which attempts have been made to solve it and which may.
6. A solution showing a deep understanding of the relevant techniques and strong evidence of creative ability and originality. Excellent use is made of graphics, tables and other aids to make clear decisions made.
7. Implementation of a solution shows an excellent grasp of accepted practices.
8. Verification showing a grasp of appropriate procedures.
9. Conclusions demonstrating clear insight into the problem and its ramifications and a well-argued position for further development.
10. Evidence of wide reading and investigation.
11. A well-defined and executed project plan with changes due to unforeseeable reasons only.
12. A work that could be published as a contribution to practice.

Distinction: Grade 70-85

1. Overall, a work of high quality showing a strong grasp of subject matter but not necessarily to the finer distinctions. A good appreciation of the related issues. Presentation is of a superior standard.
2. There is evidence that marks the student as one of superior ability. Good logical thinking with only some minor flaws.

3. There is a reasonable balance to the work but the balance is not quite right and the structure does not assist the student's cause to best effect.
4. There is clear evidence of some thought given to why the problem needs to be solved.
5. The critique demonstrates a good appreciation of the problem and the means by which attempts have been made to solve it and which may.
6. The solution shows a good understanding of the relevant techniques and some evidence of creative ability. It shows a superior ability in employing accepted techniques. The solution is well prepared and presented, and understood by an expert in the field.
7. Implementation of a solution shows an excellent grasp of accepted practices.
8. Verification showing a grasp of appropriate procedures.
9. Conclusions are sound and a good case is presented for further development.
10. A good project plan reasonably executed. Some changes could have been foreseen, but not all.
11. The relevant literature is referenced.

High pass: Grade 55-70

1. Overall, a work of solid quality showing competent understanding of subject matter and appreciation of main issues. There are, though, some lapses and inadequacies. Presentation is good.
2. There is evidence of an ability that marks the student as a capable practitioner. In the context of a team, errors in the student's logic should not prove a problem. There may be some lack of maturity.
3. The balance of the work is acceptable and the structure adequate, but again there are lapses and inadequacies.

4. Why the problem needs to be solved does not appear to have troubled the student too much.
5. The critique shows a reading of the obvious literature but a limited exploration beyond that. There is evidence the student has accepted the opinions of others a little too much at face value.
6. The solution is competent and has largely employed the relevant techniques. There are one or two flashes of creativity. There is a sound ability in applying standard techniques. The solution is competent, but how it was arrived at may not be entirely clear.
7. Implementation of a solution shows a broad understanding of accepted practices.
8. Verification showing a grasp of appropriate procedures.
9. Conclusions are straightforward. The case for further development is moderately obvious.
10. Most of the relevant literature is referenced.
11. The project plan has some obvious flaws and shows some lack of attention to detail. Significant changes had to be made in the course of the project that should have been foreseen.

Marginal: Grade 40-55

1. Overall the work is adequate, but it shows a minimal understanding of the field with major deficiencies in certain areas. The presentation just meets a professional standard.
2. There is evidence of ability that suggests the student can be a practitioner, but some doubts remain that may relate to maturity, ability or commitment.
3. The balance of the work is just acceptable and the structure adequate. However, there are major flaws and inadequacies in places throughout the work.
4. No real observation on why the problem needs to be solved is given.

5. The critique suggests only a limited reading of the obvious literature. There is evidence the student was only seeking the work of others.
6. The solution is a simple adaption of others work. There is no obvious creativity. There is evidence of an ability to apply standard techniques. The student does not seem entirely sure of why the solution is acceptable.
7. Implementation of a solution shows a restricted understanding of accepted practices.
8. The student does not seem to have fully grasped the need for verification or have a good understanding of appropriate procedures.
9. Conclusions are obvious. The case for further development is not made.
10. Much of the literature referenced seems to have limited relevance to the work.
11. The project plan seems to have been created with limited appreciation of the effort required in each stage, but the stages are logical. Quite a number of changes made, as a consequence, should have been foreseen.

Fail: Grade < 40

1. Overall the work shows a failure to grasp key concepts of the field. This may be a result of a poor presentation that fails to communicate ideas.
2. The evidence suggests the student should not be considering this profession. The work done does not imply an individual who has the abilities needed to succeed.
3. The work is imbalanced with emphasis given to areas the student believes he or she understands alone. The structure is disjoint.
4. The student is simply trying to solve a problem without any more thought to it than that.
5. The critique suggests the student has focused on a small set of references with no desire or interest going beyond those.

6. The solution is inadequate and clearly inappropriate. There is evidence of lack of ability in applying standard techniques. The student does not seem able to appreciate why the solution is unacceptable.
7. Implementation of the solution shows no real understanding of accepted practices.
8. The student either has failed to verify, chosen an inappropriate procedure or failed to use an appropriate procedure correctly.
9. Conclusions are trite and little better than a summary. The case for further development is not made.
10. Much of the literature referenced seems to have no relevance to the work.
11. The plan was simply created to meet the requirement for one and seems to show no appreciation for planning or its necessity.

The assessment of coursework masters theses is very similar, but a higher standard of work is expected. For Bachelor of Technology degree theses, the judgement is against a competent case study, but otherwise very similar.

Normally the examiner and co-examiner mark independently. They then meet and decide a final result. If their results are significantly different, or if one of them or the Projects Coordinator raises some concerns, then a third examiner may be employed. In this case the third examiner will be completely independent of the project.

7.9 Completion

Your project report is assessed. You will notice on the cover sheet there is space for noting whether your project was outstanding, average or poor in both presentation and execution. Your Supervisor, Co-Supervisor and the Projects Coordinator decide how these will be filled in and the former two then sign the sheet.

At present, the bound copy of your thesis is kept within the Department for the foreseeable future. There is no policy at present on destroying old project reports or removing them. The electronic version is placed on a server just after the Board of Examiners has met and is available over the Department's network.

Your notebook is returned to you. After the Board of Examiners meets (which is sometime in July and December each year) then you may pick it up from the Department Office. If you do not, then after six months your Supervisor will probably dispose of it.

If you fail the project, then your project report is returned to you. If you decide to abandon it, then the School would normally dispose of it after six months.

7.10 Research graduate theses

Graduate research theses have a much more elaborate assessment procedure as you may expect. In addition, much of that procedure is controlled by the University's Graduate Studies Committee.

Each graduate student has a thesis committee, usually three members of staff, including your Supervisor. The role of this committee is to review your progress and it nominally supervises assessment. It proposes a list of potential examiners to the University's graduate committee and they select at least two.

Assessing a research thesis is a difficult task and the examiners are invariably external to ensure the thesis reaches national and international standards. It takes some time to find two who are willing to do the task hence why you are asked when you propose to submit. The University sets time limits for examination. The examiner reports are sent to your thesis committee who then make a recommendation to the graduate committee. It may be necessary in some circumstances to appoint additional examiners.

The recommendation will usually be pass or fail, but passing may be conditional on some re-writing of the thesis or other changes. In general, you should expect that it will take up to six months from when you submit before a result is available.

8.0 GENERAL COMMENTS

8.1 Are you going to solve the world's problems?

Something that tends to dominate student thinking about projects is what is a successful project? What you need to recognise is that there are several viewpoints about this. They are not mutually exclusive, but one thing that is (almost) certain is that your idea of success is quite wrong.

Success from your viewpoint means achieving the project objectives. Have you shown us that you have the methodical approach, the fault finding skills and the flair to be a professional in your field? Show us your ability! If you do, then we will award you the appropriate assessment. From the Department's point of view, though, a successful project is also one that extends you. If you fail to learn something, if it doesn't change your attitudes and opens your mind to what engineering is all about, then it is a dismal failure. The Department tries to offer challenging projects to ensure this, but it cannot guarantee that in every case.

Students often think that what is important is to 'finish' the project. Finish? In what way? Do you mean that it worked? Well, what were the specifications? How were they arrived at? Does this project meet Australian environmental standards? (We mean for electrical or electronic equipment. You might find it useful to locate the relevant Australian standards and read them. They are in the Library.) Has it been designed for manufacturability? Of course not! No matter how good, no student project is ever 'finished'. All anyone can claim is that feasibility was proved. Your project is very much a prototype in the raw and that makes it anything but a useful piece of technology. However, if you have done your job properly - clearly defined tests, a methodical investigation, an examination of all the pertinent issues - then it should be a relatively simple matter to move from your project to a genuine, working system.

What is really wrong about this attitude though, is that it fails to recognise any form of engineering is systematic. This is why you have a project plan. Thus the only meaningful interpretation of 'finished' must be that the plan as outlined was accomplished.

We said at the beginning of this Guide that the project is an attempt to introduce engineering to you. To link up lots of loose ends and to show you how it all fits together. Ahem. Not totally true. No project is really engineering *per se*. It is primarily an educational exercise and if it fails in that then it achieves nothing. Now in industry, you maximise your rewards by finding ways of avoiding problems and lowering costs. That is, industry rewards you on the basis of the dollars your work generates. Universities in contrast reward you for the intellectual skills you demonstrate. Here, you will maximise your rewards in two ways. First, through the manner in which you have planned, executed and reported your investigation. Second, in contrast to industry, in the way you have sought out and solved problems.

The first of these issues essentially relates to the thesis. That is your direct means of methodically relating what you have done. The second relates to what you are reporting. Then what you should be doing at every stage of your project is seeking out problems and finding ways around them. If your design seems temperature dependent, then find out why. If a component keeps burning out, investigate it. If you have to continually re-calibrate your system, something is amiss and its hardly practical, so find a way around it. The more problems you solve, then the more 'meaty' your thesis and the better your prospects. If you cannot solve a problem, don't ignore it; discuss how far you got in solving it. Always remember that what you are trying to draw attention to is your skill as a professional and that means your exercise of your intellectual ability.

If you are bashful about your abilities and try to disguise them, do remember staff read many theses each semester and most have been reading them for years. We are quite skilled in detecting inadequacy. If you do fool us then, you probably do have the ability and, for your future career, you would have been better off being honest.

8.2 Extensions, deferments and supplementaries

To stress again, if 'finish' means to complete your project plan – the one you completed before you began serious work – then there is no case for extensions. Similarly, as your project is supervised, then there is absolutely no case for a supplementary. If you fail to keep to the plan, then you are failing to satisfy project requirements and so you have no grounds for either.

If you do suffer serious injury or illness at any time in the project, or if you have a major personal crisis in your life – a close relative or friend dies for example – that is likely to prevent you working on your project for some time,, then contact your Supervisor as soon as possible. You can withdraw in these circumstances. Your case will be argued at the Board of Examiners and you can then carry on without penalty in the next semester. This is, of course, dependent on your Supervisor agreeing you have been diligent up to that point.

Under very extenuating circumstances, a deferment may be granted. This would be for situations like:

1. the house you share is burnt down and you lose the disks with your thesis on it;
2. you have an accident on the freeway on your motorbike while trying to deliver your thesis and end up in RPH with two broken legs;
3. you are a part-time student and are called to an emergency in the North West by your employer;
4. your supervisor suffers a hear attack while reading your draft.

If you believe you have a good case for an extension, then you must write a letter to the Head of Department before the Board of Examiners meets outlining your case. The Projects Coordinator, your Supervisor and others will consider the request and you will be notified in writing of the outcome. However, it has to be an exceptional case. Further, any deferment will only be for a short time.

Some important issues to note here. The University has now moved the Graduation Ceremony to early in the year and abandoned the second graduation ceremony later in the year. One result of this is that if you receive a deferment for the second project unit and you are doing that unit in the second semester, then you will not graduate if you do not present your thesis before early December. That means any deferment effectively has to be limited to about three weeks. Similarly, there are visa issues for international students that set a similar limit. Deferment, then is purely a mechanism for overcoming a last minute, short, unforeseen event, and that is all.

8.3 Changing projects

If you fail the first semester of project work you are required to select a new project. If you fail the second, then you must write another thesis. You do not fail that unit because your technical work is deemed inadequate and you may not do more.

If you decide to abandon your current project at any stage and tackle a new one, then you must start anew. Your enrolment is conditional on you doing a particular project. Outside of that,, there is nothing to stop you changing.

8.4 The Projects Coordinator

The Projects Coordinator is the unit controller for all undergraduate project units within the Department. As such, the coordinator is responsible for managing those units, which means:

1. maintaining and issuing project topics nominated by the academic staff;
2. generally managing industry-based projects;
3. keeping records of student supervisors;
4. maintaining documentation;
5. ensuring requirements are met;
6. ruling on particular project issues;
7. maintaining assessment records.

In addition, as the unit coordinator, the Projects Coordinator is ultimately responsible for all results. In practice, the Coordinator defers to assessments put forward by supervisors, but there is the responsibility to overrule any that are thought to be outside the spirit and regulations of project work.

8.5 Suggestions or complaints

Suggestions or complaints about any aspect of project work should be directed to the Projects Coordinator.