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 in the week free. Some points to note:

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 can 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. It would be best to load your presentation with a USB stub or CD. You may bring your own lap top.
5.2 Creating your multimedia presentation

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

It is expected this is a Powerpoint slide presentation, but 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. It is up to you to decide how to maximize the effectiveness of 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 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’. The rest 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; say 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. As we have no control over the colour calibration of the projector, do not rely on subtle variations of colour to transmit information. This 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 that used in this text with the end-caps on letters like “I”. Headings can be a sans 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, to run well. Our machines may not be as recent as yours, and they may not have the same software installed.

v. You 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,

4. **DO NOT CREATE A WRITTEN ADDRESS.** 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. Because of nervous energy, time may seem to be a lot greater than it actually is. Thus there is the danger of ‘ad-libbing’ and then running out of time,

   ii. Take your watch off or bring a clock and make sure you keep to your time. Thus you need ‘markers’ in your address.
iii. A problem many people have is simply 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 confusion over the issue. A thesis is not an elaborate laboratory report, a technical report, a written tutorial, an essay or similar literary creation. Like these, though, it is a particular written communication with its own unique format, both physical and logical. Further, also like these it needs to be in clear, grammatical English. Where it differs is that it reports work done and since it is reporting completed actions then it is written in the past tense. It is also a communication that focusses on intellectual issues. That is, what it communicates is 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 a 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 keys to 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 and indeed may not be very important to them. Further, how do they compare you to another applicant for the position from another institution on the basis of an academic record? However, every university in Australia - and indeed the world - has project in the final years of engineering programs. Reading that thesis will say a great deal about your ability – and especially your personal qualities like initiative – and it is in terms industry understands very well. Further, it is very easy to make a comparison of two different final year reports in these terms. All that remains is to confirm your personal qualities in interview.
Two incidental points on this. 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, it is a very good idea to make a very good copy of your thesis, have it properly bound by an accomplished book binder and take it with you to interviews as well as a CD to leave with them.

For whom is the thesis written? First and foremost, it is written for your examiners as it is primarily an instrument of assessment. However, there are other readers. You need to take their needs into account to some degree, but the focus must be your examiners. Who are they? The key point to note here is that they 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 in this day of spell and grammar checkers, 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 one sentence is vital; 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 synopsis. 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, to 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, the synopsis 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 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. As they are expert in their field, they 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 synopsis, 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.

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 along the lines of:

   communications is one of the most rapidly growing industries
   one of the most important areas in communications is optical fibres
   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 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.

Do note it 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 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 their significance. 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 argument. Recommendations now are expected to define where future research should be directed and that demands considerable logical argument and interpretation of the work you have done. Very carefully work and even more carefully review this chapter.

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 the opinions expressed are not necessarily 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 hows 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.
Once, all theses were written by hand then laboriously typed. You can still do that if you wish, but you will find it much faster and cheaper to type it directly yourself. Be very careful of the spelling checker. Indeed, it is a good idea to turn it off and then carefully note at a later stage what it is recommending. A hint on checking the document. Do what book publishers do; print it out as a long, thin, column. You will be amazed how much easier it is to locate faults.

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.

3. On your third pass, check the structure. Make the arguements logical. Make sure ideas flow and link appropriately together. Challenge your ideas and make sure the answers are there somewhere. Make sure paragraphs really are paragraphs. Do the same for sentences, avoiding literary devices like short sentence fragments. This is technical writing.

4. On your fourth pass, check the tense. Make sure actions that are complete are expressed in past tense and those that are time-invariant are in the present. See the section below on this.
5. Scan you entire document for ‘I’ (and ‘we’) and eliminate. That should require some editing, but that should be used as an opportunity to tighten the text. Note; ‘the author’ is the same as “I” – do not use it!

6. Now scan again for grammar. Make sure things that are plural use plural verbs and vice versa. Make sure there are no split infinitives. (Do you know what they are?) Make sure adverbs precede verbs. (Adverbs are those words which mostly end in ‘ly’ and which 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 like that in the preceding sentence. Make sure your sentence structures conform to accepted standards. 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 argument 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.

6. Scan for punctuation. Beware of using ; or : unless you really know how to use them and watch the use of commas. A small point about commas; in a sentence you should generally have ‘but’ but rarely ‘and’. In a thesis, you would never use ! and rhetorical questions are out of the question so you have no need to use ? either. You also generally avoid foreign words unless there is a good technical reason to use them and you never underline words or otherwise emphasise as, once more, this has no place in a thesis. That is like email shouting.
7. Now scan for the simple things. That is, text where you inadvertently put in too many spaces due to editing, or where you typed a comma as the last one in this sentence and made it 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 MUST submit a draft of your report to your Supervisor. **IF YOU DO NOT YOUR THESIS WILL NOT BE ASSESSED.**

There are several reasons why you must submit a draft:

1. Since this is going to be a very public document, you need an ‘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 is NOT assessed. Any result you gain is a function of the corrected draft; the final report.

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 what your supervisor will not do is extensively correct your English. They will point out there is a problem, but their role is not to act as an editor. 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 theses will be checked by the Projects Coordinator. If they do not meet the requirements 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.

YOU WILL BE PENALISED IF YOUR THESIS IS REJECTED.

Please note this Guide is in exactly the format required. The only real difference is that a more literary style of writing has been used, 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 is unacceptable in **ALL** circumstances. In particular, handwritten symbols must **NOT** be used.

2. Use A4 size paper and if not from the same ream then ensure it has the same **colour**. You should check the quality of the paper ensuring that it has no flaws, is not water damaged or creased.

3. Schematics or large drawings may be produced on larger size sheets, but folded to fit in 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 if you feel the necessity, indent a further centimetre.

8. All chapters are to begin on a new page.
9. Figures and tables ideally should be placed at the top of a page and centred. 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 binder**

You will need to organize a ‘pillar and post’ binder and present your thesis in that. You must use one of the bookbinders recommended by the University Library as they are aware of requirements.
As of 2007, the Department has changed its requirements so that they are the same as all other theses at Curtin. That means the only issues that you need to be concerned with are as follows

- The binder is to be 305mm by 220mm.

- The spine is preferably 15 mm thick, but if your document is sufficiently thick, then you may extend it to 30mm.

- There are to be brass inter-screws to hold the document.

- The inside of the binder is to be lined.

- The colour of the binding is green for Bachelor of Technology theses and black for Bachelor of Engineering and masters by coursework theses.

The binder you choose will not accept your order unless you give them an authorization letter signed by the Projects Coordinator or their nominee. See the Project Home in the Department’s web site for full details of the approved binders, or visit the following site http://procurement.curtin.edu.au/staff/binding/index.cfm in the University’s web pages. Both sites have the authorization form as a download.

The basic format of the binder is as follows. On the spine will be:
Your initials and family name.

Your course (such as B.E. (Computer Systems Engineering))

The year

On the front cover of the thesis will be:

The Curtin logo

Your full name

The full thesis title.

You are only required to submit one bound thesis and this is at your cost. You need to punch your paper copy and screw it into the binder.

Research graduate theses are bound like a book. This is organised 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 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 a thesis then you read a standard reference such as:

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


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.

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, especially colons, semi-colons and commas within sentences. 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 already 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. Note that factual also means words like ‘about’ are rarely used, and expressions like ‘the blades rotated quite fast’ are replaced with an exact value of speed or a reasonable estimate.

2. It does not employ underlining or bold within the body of the text. They are only used with headings. 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’.

By far the major problem in writing a thesis is dealing with tenses:

1. A thesis writes about events, artifacts and knowledge.

2. 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.

3. What to do if an event is not complete? For example, a standards committee is still meeting. You need to indicate that. Thus you typically write “at the time of writing, the Committee has yet to reach 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.

4. Artifacts may be referred to in generic terms or specific. For example, the 68HC11 microprocessor as a 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, but of course your tests of it were done in some way.
3. 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 opinion. 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 abbreviations. That includes contractions like “don’t”, but more particularly ‘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 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.

5. Some 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 accepts there are several standard spellings. Thus this is rarely used in a thesis, 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.

6.5.5 The written structure of the thesis

There is a quite defined format for all forms of theses in the Department, namely:

Title page

Documentation sheet

Synopsis

Submission letter

Acknowledgements

Nomenclature

Index

Body of the Thesis

References

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 arguments 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. 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

A blank sheet available on the Project web site with the Curtin logo on it is to be used for this purpose. 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.

2. DOCUMENTATION SHEET

Blanks are obtainable again from the Projects web site. You need two copies; one to be included within the bound thesis and one to be handed in separately with the marking thesis. 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 meant to be a summary of the project; that is provided elsewhere. Rather, what it should do is link all the main
keywords of the thesis into one paragraph. It is intended to draw the casual reader in.

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. Do not include headings; it is a letter.) 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. Thus that means in general terms you only mention:

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

\[ \Phi(N) \quad \text{Euler’s totient function} \]
\[ \omega(N) \quad \text{The number of distinct prime divisors of } N \]
\[ \pi(N) \quad \text{The prime number distribution function} \]
as these are unfamiliar to most electrical engineers.

Remember that the prime 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 the project is important. This is usually like this (although this is quite abbreviated):

*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 that matter. 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.
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 an idea 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.

This section is one of the most misunderstood sections of a thesis and so some explanation of its rational 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 influenced 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. REFERENCES

The reference list is treated as chapter and follows the conclusions. While it is numbered as a chapter, it has no text and no sub-divisions.

Every work you mention here MUST be referenced in the body of the text. This is NOT a reading list. As a thesis is not a tutorial, it rarely if ever includes a reading list and if it does then it is a separate chapter. A circumstance where you might see a need to include one is where a standard took some years to develop and for some reason you see a need to have chronology of the developments leading to that standard. However, to stress again it is a very rare circumstance where you would need this.
Referencing is not trivial. See the later section on this for further details.

13. APPENDICES

Appendices serve several purposes. The main reason for them is simply to report information that needs to be reported, but which is of secondary importance. For example, a lengthy mathematical derivation or 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 title. 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 report 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, and the heading applies to the entire chapter. Now if there is any
sub-division of those chapters, then each of those sub-sections is also numbered and again the heading applies to the entire sub-block. Thus if chapter two is sectioned, its sections will be numbered 2.1, 2.2, 2.3 and so on.

Where students invariably fall down is in the next division. Why is a complete mystery. The need to suddenly change to an entirely new format is not at all clear to the Department.

Assume a section 2.2. It might be on, for example, the design of particular amplifiers and there might be ten of these to discuss. The heading of 2.2 will in some way indicate this entire section is devoted to discussing amplifiers, but you wish to treat each of these individually. Therefore, break this text into separate sections and give each its own number and heading where that heading indicates the content. Thus your first block of text is labeled 2.2.1 and the heading would be along the lines of “An introduction to amplifier design”. In that text you would indicate that there are ten main approaches, but possibly you intend to only discuss six. The next section then, labeled 2.2.2 with an appropriate heading now discusses one of them. Similarly, 2.2.3, again with an appropriate heading, discusses another 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 very rare circumstances that justify going to 2.2.2.1 for example. That is not to say they do not occur, but they are extremely rare.

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. The reader now knows the scope of text that each heading covers. Thus a 3.0 heading covers an entire chapter, a 3.2 a section where this may include a 3.2.1 and 3.2.2 that cover specific issues of the heading of 3.2.

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, here 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, 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 now uses the Chicago format for references and this applies to all Curtin publications, reports and theses. Details can be found at:


This format is chosen as it covers all forms of referencing.

A brief summary of the format. First, in the body of the text most references are one of:

1. (Jones, 1991)
3. Jones (1991a)

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 et. 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)”

Where referencing gets complicated is in situations like this. You are doing a project with Western Power and one of their senior engineers tells you that the way you should do something is in this particular way. Alternatively, you contact someone about a part and they tell you all sorts of things that aren’t 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, what you list is:

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 famous author Anon.

The reference list obviously assumes some importance here. The first thing to note is that 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 other requirements are as follows:

1. For a Journal articles, the format is:


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:


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:


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:

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


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. 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 there be a change.

A more serious academic problem you need to consider 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.

You would be aware that about half of all electrical engineering research literature is published by the I.E.E.E. They have a format similar to the above, where the major difference is references a numbered in the reference list in the form:


Then the body of the text it is only necessary to say “In a recent overview of embedded systems (13) it is pointed out that…”. For technical publications this is often far more convenient as often the one reference is referred to many times and also reference is often made to several sources at once. If you wish, you may use the I.E.E.E. format but ensure you use the exact format and note the precise variation from the difference referencing methods given above.

### 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 if 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 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 theses

The same conditions apply to graduate coursework theses. The only real difference is that that a more exacting standard applies for content. The requirements for research theses are listed in the Graduate Handbook. In addition, 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 format is as largely described. However, 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 Graduate 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 to their thesis. Three comments on this.

1. Please use a CD or DVD.

2. 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, fix the CD in a pocket in the back of the thesis folder. Do note this CD is NOT the same as the electronic copy of the thesis.

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.

2. Label the CD with your name and the year. Put a physical label on the CD—not a sticky label, use a permanent pen—and put a small Readme file on the CD 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, include that directly into your appendices. This means there is a slight difference between the two copies; your hard copy says the appendix is in the CD attached to the rear of the thesis, but it is directly there in the electronic. This is the ONLY difference allowed.
6.10 Summary

What is a thesis?

A communication focussing on reasoning behind decisions made written for examiners alone.

What purpose does it serve?

It is mainly a means of assessing your ability. It helps you get a job.

It records a completed engineering activity

It demonstrates the capabilities of our graduates.

How is it written?

Past tense because it records actions taken and completed.

Third person because you are expressing your views to your examiners. Do NOT use we; YOU are explaining. Do NOT use ‘the author’ or other subterfuges for “I”.

All opinions expressed are assumed to be yours unless you reference someone else.

Think on how the examiner will read it when you write your thesis.

Write, review and edit frequently

Your examiners

They examine, so they are not learning. Remember they are expert.

The initial structure of the thesis

Title – make it your keyword

Synopsis – a paragraph giving further explanation – include more keywords

Index – indicates the structure of the thesis – make the headings meaningful

Planning the thesis

Write the title synopsis and then a tentative index.
Now put down bullet points for those heading and strike a balance

*The body of a thesis*

**Introduction**
- Why is this project important
- What was achieved
- Structure of the thesis

**Background**
- Your understanding of the current ‘state of the art’; do NOT write a tutorial.
- Reference most material; only discuss what is important to the project.
- Do NOT call it background; link it to what is the ‘art’ discussed

**Detailed problem statement**

**Detailed problem solution**

**Verification of the proposed solution**

**Conclusions**
- Comment on the significance of what was achieved
- Comment on how appropriate were the methods used
- Discuss where to from here? What do you recommend as the next step

**The draft**

YOU MUST PRESENT A DRAFT

You need to do that to get an objective opinion on how to strengthen it.

*The physical format*

Read section 6 carefully

Note the documentation sheets plus the blank sheet with logo on the web site for your formal letter.
Note 6.6.6 on numbering very carefully.

Referencing; use either the Chicago or I.E.E.E. methods

**Attachments**

Fold large attachements like schematics to A4 and attach in appendices

Put bulk data, videos, code, etc in a CD and attach to the inside rear cover.

**Electronic copy of the thesis**

On a CD, and label it

Include a README on the disk with your name, degree, project title.

Only use WORD

If you have CD in the hardcopy, merge it with the electronic copy.
7.0 ASSESSMENT OF THE PROJECT

7.1 Introduction

Assessment in education serves several purposes. 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 and work to a plan. There are also no deferments granted given that time management is an important outcome.

3. 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.

4. 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.

5. For the 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.
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.

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.

5. You must have demonstrated in some way that you have reached the milestones in your plan. You need to discuss that with your supervisor, and it may mean they ask you to submit a short progress report.
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.

7.2.3 The second 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.

4. You must have delivered a short seminar on your project topic.

5. You must supply a completed Clearance sheet showing you have returned all borrowed materials.

6. You **MUST** have presented a draft to your supervisor.

7. You must submit to the Faculty Assignments 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) with loose documentation sheets;
iii an electronic copy on CD with your entire thesis upon it ( see section 6.9 ), again in accordance with Departmental regulations;

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 and you will be penalized.

Please note this submission date should be seen as a final date rather than the actual date you submit. Excuses of the form the photocopier broke down will not be accepted.

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. You must sign a declaration accepting that and submit it to the Projects Coordinator 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 do believe you have developed a patentable idea, then what do you do? The first step is to ensure that it is patentable. Some brief comments.

Patents and copyright are both measures to provide protection for intellectual property (IP), but 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 schematics, 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 use 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.

So, 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 more strict in its approach. It is now standard throughout Australia that any patents produced by research students belong to their University.

A comment on your thesis and copyright. Legally, you have copyright as you produced the document. However, you have submitted the document to the University as a course requirement knowing the University intend 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.
Please do NOT mark your thesis ‘copyright’. As a public document, that has no legal force or meaning. Equally, do not place company logos or so forth on it.

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, especially commercial. Apart from the fact they make the thesis non-standard and so unacceptable, those provision 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 before the project begins, 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. You may then gain a few extra marks for meritorious element.

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, 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 it was clear some effort had to be expended to solve it.

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 determines, 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 variations 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, a strong appreciation of the related issues and an ability to communicate well.

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 why.

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. Communication 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 why.

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. Most of 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. Communication 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.

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 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 other’s work. There is no obvious creativity. There is evidence of an ability to apply standard techniques. The student does not seem entirely sure 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.

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. This 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 approximately ten years. Due to issues with storage, they are then destroyed. The electronic version is placed on a server just after the Board of Examiners has met and is available over the Department’s network. An archival record is also made of all theses and so these will be available for the foreseeable future. Your notebook and second thesis copy is returned to you. After the Board of Examiners meets (held sometime in July and December each year) then you may pick them up from the Assignments Office. If you do not, then after six months they will be discarded.
If you fail the project, then your project report is returned to you. If you decide to abandon it, then the Department would normally dispose of it after six months.

Your supervisor may ask for a copy of your thesis. This is a private arrangement, not a requirement. If you agree, usually your second copy is retained by your supervisor.

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 with usually has three members of staff upon it, 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 one examiner is usually external to ensure the thesis reaches national and international standards. Thus it can take some time to find one willing to do the task. The Department, naturally, has no control over this or the time they take. Their 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.
7.11 Summary

*General issues on assessment*

A checklist of requirements must be met before assessment proper in each semester.

There are no supplementaries as project is supervised work following a plan.

There are no deferments as time management is an important outcome.

First semester assessment is either P or F. P meaning work is satisfactory and keeping to plan, or it is not.

Second semester assessment involves a seminar and thesis, and both are assessed holistically. That is, a high grade is achieved because all aspects are excellent.

For calculating honours for the Bachelor of Engineering degree, the second semester grade is used in place of the P for the first semester.

*Enrolling in project units*

You may not enrol in project units unless your course coordinator approves.

Your enrolment is conditional until a project registration and Patent declaration form is submitted.

*The first semester checklist*

No breach of any Departmental laboratory rules or regulations of the University, particularly relating to copyright and IT.

You must have meet regularly with your supervisor.

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 submitted your project notebook before 4.00 PM on the last Friday in the last teaching week of the semester to your supervisor.
You must have demonstrated you have reached the milestones in your plan. You need to discuss that with your supervisor, and it may mean they ask you to submit a short progress report.

*The second semester checklist*

No breach of any Departmental laboratory rules or regulations of the University, particularly relating to copyright and IT.

You must have delivered a short seminar on your project topic.

You must supply a completed Clearance sheet showing you have returned all borrowed materials.

You **MUST** have presented a draft to your supervisor

You must submit to the Faculty Assignments 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 requirements;

ii an unbound copy with loose documentation sheets;

iii an electronic copy in Word on a CD of your *entire* thesis (see section 6.9 for full details);

*Checking theses*

All theses will be checked by the projects coordinator. Any rejected for not meeting requirements will be penalised.

*Copyright*

You own the copyright to your thesis, but by offering it for assessment you are giving the University permission to reproduce it for non-commercial gain. Do not mark it copyright, and do not use registered trademarks or similar insignia within it.
**Public disclosure**

Only by prior agreement will an industry project be withheld from public disclosure and then at most for year.

**Assessment in the second semester unit**

A grade is awarded; 15% due to the seminar and 85% for the thesis. Both are assessed holistically. That is, for example, a mark is not awarded because one chapter of the thesis is well-written, but because all are.

The marking scheme follows the basic AVCC marking scheme. Your work is assessed as being in one of 5 bands; then additional marks may be given for particularly well-done elements.

Assessment is by the supervisor and co-supervisor (or another member of staff familiar with the area) with the projects coordinator acting as moderator.
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 it's 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.

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 hospital 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 heart attack while reading your draft.

If you believe you have a good case for a deferment, 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.
8.4 Suggestions or complaints

Suggestions or complaints about resources for project work should be directed to the
Projects Coordinator
APPENDIX 1: A quick Guide to writing your draft thesis.

*Step 1: The title and synopsis*

List, say, 10 keywords that describe your work.

Select the most important and construct a sentence about it. This is your title.

Compose the rest into a paragraph. That is your synopsis.

*Step 2: The index*

Create a provisional index as follows:

1.0 Introduction
   1.1 Justification
   1.2 achievement
   1.3 layout

2.0 Background

3.0 Problem identification

4.0 Solution

5.0 Verification

6.0 Conclusions

References

Appendix 1: The project plan

Under each heading list the major bullet points you want to address or attach earlier prepared documents.

Now:
• Split each chapter into sections as seems appropriate.
• Select headings for each chapter, sub-section and sub-sub section so that overall it is clear from your index what has been done.

Step 3: Write

Write each section in one go. Then review it.

Write:

• in the third person;
• in the past tense as you are describing completed actions in the main;
• focus on the decisions you made that reflect on your engineering judgement as this is a justification of your efforts, not a report.
Appendix 2: Checklists for the presented thesis

These two checklists derive from work done by a previous student (Rizky Farhan, 2006)

Checklist for the Physical Thesis

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Checklist for the Thesis structure

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<td><strong>Thesis</strong> is essentially about communicating the reasoning behind various engineering decisions made.</td>
</tr>
<tr>
<td>2</td>
<td>It shows my potential as an Engineer via elements of my key success</td>
</tr>
<tr>
<td>3</td>
<td>Describe technical activities</td>
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<td>4</td>
<td>Definition of a <strong>paragraph</strong>: A paragraph must have a beginning, a development, and an end. Each paragraph must be able to stand independently</td>
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<td>Final thesis must be based on an approved draft or it will not be assessed</td>
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**Thesis Content Guide**

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<tr>
<td>8</td>
<td>Explain what thesis is broadly about; use all keywords</td>
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<tr>
<td>9</td>
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**Indexing (Table of Contents)**

| 10    | One line summary per heading |
| 11    | Headings should summarise the content of the item under heading |
| 12    | Headings should be a clear one line statement |
| 13    | As a whole clearly define the structure of the thesis |

**Thesis content**

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<tbody>
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</table>

**INTRODUCTORY LETTER**

| 15        | To the HOD offering the thesis to meet partial requirements for your degree |

**ACKNOWLEDGEMENTS**

| 16        | Acknowledge supervisor, and co-supervisor if assisted. |
| 17        | Acknowledge any technical support offered, or scholarship or similar support. |
| 18        | Do NOT acknowledge friends, God, etc. ONLY those who gave direct support such as editing. |

**NOMENCLATURE**

| 19        | ONLY include if have a page or more of unusual symbols. |

**INTRODUCTION (First to be read by examiners)**

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<td>First part is to precisely define why the topic was worth investigating from its importance and application in real life</td>
</tr>
<tr>
<td>21</td>
<td>Second part is stating why this is a singular piece of work</td>
</tr>
<tr>
<td>22</td>
<td>Third part briefly describe in few sentences, based on the structured index, the basic contents of each of the chapters</td>
</tr>
</tbody>
</table>

**What is expected in introduction:**

<p>| 23        | Set the scene as it were |
| 24        | A set of arguments for undertaking this project |
| 25        | A project examines a small part of a big problem. Explain that big problem |
| 26        | Why is it important to solve that problem |</p>
<table>
<thead>
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<th></th>
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<tbody>
<tr>
<td>27</td>
<td>Why is it important to undertake the project</td>
</tr>
<tr>
<td>28</td>
<td>Close the scene with: from that big problem, acknowledge the particular problem I am set to solve</td>
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<tr>
<td>29</td>
<td>Discuss briefly (in part 2) on significant problems encountered, how the problems are tackled, and what is achieved</td>
</tr>
<tr>
<td></td>
<td>BACKGROUND (Second to be read by examiners)</td>
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<td></td>
<td>Define the environment in which the project was done</td>
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<td>Clearly demonstrate understanding of the current practice and ideas defined in literature</td>
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<tr>
<td>31</td>
<td>Justify understanding of problem and concept, not just an elaborate explanation</td>
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<tr>
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<td>The background should then be the basis to verify the solution I would be proposing in later chapters.</td>
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<tr>
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<td>Focus on elements that are important to the solution</td>
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<tr>
<td>34</td>
<td>Must include references to show that I do understand the ‘state of the art’. Use these to back opinions expressed. Critique rather than list.</td>
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<td>The title should be clear statement of what this is background to, not just the nebulous ‘background’. It should highlight the key issues</td>
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<td>DETAILED PROBLEM STATEMENT</td>
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<td>DETAILED PROBLEM SOLUTION</td>
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<td>VERIFICATION OF THE PROPOSED SOLUTION</td>
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<td>CONCLUSIONS (Third to be read by examiners)</td>
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<td>Analyse my work; is there a better way given my experience?</td>
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<td>Significant problems solved</td>
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<td>38</td>
<td>Significant part of project work / achievements</td>
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<td>Recommendation of future work</td>
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<td>Other appendices optional; use them to include material like source code, major drawings, large mathematical derivations, test results, etc that are relevant to the thesis but not relevant to the core body of the text</td>
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<td>ELECTRONIC COPY</td>
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<td>If there is a CD attachment in the hard copy, include the content in the relevant appendix for this electronic copy</td>
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<td>48</td>
<td>Include a README giving your name, student number and program</td>
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<td>Present as an ISO 9990 compliant CD or DVD.</td>
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