IMPORTANT
Please read carefully and keep in a safe place for future reference.

A GUIDE TO:

HONOURS AND COURSE WORK DISSERTATION WRITING

PART 1:
SUBJECT REQUIREMENTS FOR
ERTH4001 GEOSCIENCE HONOURS DISSERTATION
&
GEOP6004 & GEOP6007 GEOPHYSICS PROJECT – THESIS PARTS A&B

PART 2:
DISSERTATION FORMAT

PART 3:
HOW TO WRITE THE DISSERTATION

written by
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In 2009 Edited by
Assoc. Prof. B.M. Hartley and Dr. A. Bona,
Previously edited by
[J.A. McDonald and B.J. Evans]

March 2015
PART 1

SUBJECT REQUIREMENTS FOR THE GEOPHYSICS DISSERTATION

Project work in the Geophysics Honours degree

The Bachelor of Science (Honours) degree in geophysics involves a research project and the production of a Dissertation. The Dissertation will be written in Australian English. Students enrol in ERTH4001 Geoscience Honours Dissertation. This unit is valued at 100 credit points. The same applies to students enrolled in the Master of Science (Geophysics Major) – see unit details above in the heading.

Supervision and Sponsorship

Students are assigned a Supervisor who is a member of the academic staff. Associate Supervisors may be appointed from sponsor groups, or research partners. An Honours Coordinator is responsible for the overall management of the subject.

Many projects in the Department are supported by external sponsorship. As a result projects normally chosen have a direct relevance to the exploration industry. Sponsored projects are highly recommended as they can lead to subsequent employment with the sponsoring company.

Project Objectives

Geophysics projects at this level are designed to permit a student to undertake a directed research project in which he or she takes decisions on a day to day basis. Major decisions are made in consultation with a supervisor, with whom the student meets on a regular weekly basis, or more frequently as found necessary.

The student is required to:

- Read the literature critically and identify a problem or issue. This may be determined by a sponsoring company.
- State the problem or issue in a form suitable for investigation
- Propose a work program to address some aspect of the problem or issue
- Carry out the proposed work program
- Process and analyse the outcomes of the work
- Evaluate the significance of the outcomes
- Draw conclusions arising from the research work
- Present some aspect of the research at a public meeting
- Prepare a formal bound dissertation (Dissertation)
**Timetable**

The dates quoted in the following section are correct. Similar strict deadlines are set each year.

Time management is a key aspect of project work and it is an essential part of the successful completion of this Honours Dissertation unit. In order for the results to be obtained and recorded in a timely fashion for graduation, the following deadlines must be strictly adhered to unless special permission is obtained from the Honours Coordinator.

By **Monday 23 March** a research proposal must be lodged with the Honours Coordinator by the student after approval by the Project Supervisor. **Use the format given in Appendix A ‘Notes on preparation of Honours and course work research proposals’**.

Following submission of a proposal, each project will be assessed/reviewed by a meeting of all Departmental Supervisors to ensure that the proposed projects are suitable, and that adequate resources are available to complete the proposed project. **~25 March**.

Modified research proposals with the Supervisor’s signed endorsement on the cover page are to be submitted to Deirdre Hollingsworth by **27 March**. If any projects have **Confidentiality clauses attached to them**, then the appropriate **IP Confidentiality form must also be signed and submitted by this date** (for further details discuss this with your supervisor and Eric Takam).

An oral presentation outlining the project to the Department and a document containing the research outline with literature review (this could be the first chapter of the thesis) is required by **Wednesday 27 May** and must be submitted to Eric Takam Takougang.

Both the presentation and the written research outline with literature review will be assessed and will form the basis of the grade for the first semester of **ERTH4001 Geoscience Honours Dissertation**. The written research outline with literature review should be written in the Dissertation format described below and is to be submitted by **Wednesday 27 May**.

All Supervisors and students will be in attendance. This will ensure that:

- The project is developing as expected when first proposed
- There is a good prospect of completing the proposed project
- The student is working at a suitable rate
- The student is responding to the advice given at regular meetings with the Supervisor.

The oral presentation is also an opportunity for advice and general suggestions to be offered from a wider group than those with whom the student has been working. It will also serve as a ‘practice’ for later public presentations. Further details of these oral presentations are given in Appendix B ‘Departmental presentations of Honours projects’.

During the FIRST week of Second Semester commencing **3 August**, a review of progress in the project will be undertaken by a meeting of academic staff. **Students will need to provide a 1 page (maximum) statement of their progress to the Honours Coordinator before 7 August**.

By **21 October**, a seminar on the project must be presented to the Department. This is a rehearsal for a public seminar to be given on each project, usually in conjunction with “student nights” organised by the Australasian Institute of Mining and Metallurgy or the WA Branch of the Australian Society of Exploration Geophysicists etc. These Societies usually give awards which students may cite on their CVs. Presentations to ASEG or AusIMM may take the form of oral presentations or posters, as required by that Society.
23 October is the date for lodging the first printed Dissertation DRAFT with the Supervisor who must provide comments and feedback by 30 October. This should be carefully prepared as supervisors will react unfavourably if they are faced with a huge number of grammatical errors and poor formatting. It is advisable to go over the format of the Dissertation with the supervisor when preparing the internal seminar, or earlier. Part 2 of this document provides guidance on the Dissertation Format.

6 November, 4.00pm is the due date for the submission of the FINAL UNBOUND VERSION of the Dissertation for marking. Students may be penalised by a reduction of their final mark by 1% for each day overdue. First and second examiners are to complete their assessment of the theses by 13 November.

After any further corrections, the FINAL ELECTRONIC VERSION, including the electronic data and programs/scripts etc, must be submitted by 27 November, see further details under ‘Dissertation Completion’. Guidelines for material to be included under the Electronic Submission can be found at the following web site under “STUDENTS”, “ELECTRONIC PAPER SUBMISSIONS”.

http://geophysics.curtin.edu.au/students/electronic-submission.cfm

These deadlines may only be varied on medical grounds or prior arrangement with the Honours Coordinator and Head of Department. Non-adherance to the set deadlines can affect your final mark.

Dissertation Details

- **Dissertation Format**: double spaced, 12 point ‘Times New Roman’ font, including tables, figures and references but excluding appendices.
  May be in the form of a –
  - thesis........................................................................................................70* pages maximum
  - industrial report.......................................................................................50’ pages maximum
  - publishable paper/review article.........................................................30’ pages maximum
  - documented software............................................................................30* pages maximum
  *

- **Acknowledgments**: All sponsors and support MUST be acknowledged in the front of the Dissertation before the Table of Contents.
  e.g., This research was conducted as a project for the Curtin Reservoir Geophysics Consortium (CRGC).
  e.g., This project was financially supported by the CRC for Greenhouse Gas Technologies (CO2CRC).
  e.g., This research was a project in the Centre of Excellence in High Definition Geophysics (CHDG).

- **Executive Summary**: Students must provide a separate bullet point list (i.e. maximum of 1 page) summary of their contribution to the area of research which must accompany the dissertation document.

Plagiarism

Plagiarism occurs when work or property of another person is presented as one's own, without appropriate acknowledgement or referencing. Plagiarism is a serious offence which can lead to academic dismissal. For more information refer to http://academicintegrity.curtin.edu.au/students/.
Dissertation Completion

Upon completion of the marking process, it is a requirement that the student MUST make any final corrections or modifications to the Dissertation in consultation with the supervisor. The Thesis/Report/Paper, in electronic form, including the electronic data and programs/scripts etc, MUST be lodged with the Senior Technologist (Robert Verstandig) before, but no later than **4.00pm, 27 November**. Students must email both Robert Verstandig and Deirdre Hollingsworth to confirm that this process has been completed.

[Authorisation for Graduation will not be given until this process is completed.]

Laboratory Book

Students will be issued with a laboratory notebook which remains the property of the Department. Students are required to insert all notes and workings into this book. It does not need to be tidy as it is intended to serve the function of a work book, preventing the loss of key information such as references, input and output details of computer programs etc. Material may be pasted into this book if convenient. The Laboratory Book must be returned to Deirdre Hollingsworth by **4.00pm, 27 November**.

Evaluation

Dissertations and levels of awards will be in accordance with the guidelines attached in Appendix C ‘Guidelines relating to examination of dissertations and grading of Honours awards’.

Student Rights and Responsibilities

It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter
- the University's Guiding Ethical Principles
- the University's policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University's policies on appropriate use of software and computer facilities

Information on all these things is available through the University's "Student Rights and Responsibilities website at: [http://students.curtin.edu.au/rights/](http://students.curtin.edu.au/rights/).

Dr Eric Takam,
Honours Coordinator,
DEPARTMENT OF EXPLORATION GEOPHYSICS.
APPENDIX A

NOTES ON PREPARATION OF HONOURS AND COURSE WORK RESEARCH PROPOSALS

Your research proposal must be developed in conjunction with your supervisor. However, preparation and submission to the Departmental Honours Review Committee is the responsibility of the student.

Use the following format:

Page 1:

DEPARTMENT OF EXPLORATION GEOPHYSICS

BSc Honours (or MSc) Research Proposal

DISSERTATION TITLE

Student Name, Qualifications

Supervisor’s Name/s

Date

Page 2:

• Title

The title should be carefully selected so that in a scientific key word index, the area of research, the issue investigated, methods used etc. taken from the title will truly indicate the nature of the work.

• Introduction  (Setting/background for the research)

This is the background to the proposed study, defining the field of endeavour and its general significance.

• The Issue  (Problem/need/motivation for the research)

This is a key section in which you make clear the research issue and the relevance and need for the work program which you propose. This defines the motivation for the research and its importance.

• Proposed Research  (Methodology)

Outline the approach which you propose in order to examine (and solve?) the problem.
• Work Program

Give a broad overview of the things you propose to do in attacking the problem.

• Facilities/Resources

Give enough information to indicate that the proposed work program can be carried out. Things such as finance, computer facilities, equipment, transport etc. should be covered.

• Specific Computing Facilities Required

List specific hardware, software, and any special packages required at Curtin. Indicate if large volumes of data will be required, i.e. disk space, if >1GB.

• Ethical Issues/Confidentiality

Existence and method of dealing with constraints, sponsor needs etc.

• Data Storage

Data will be stored in the Department of Exploration Geophysics in electronic form, and in a numbered laboratory note book.

• Timetable

In monthly periods or as appropriate, outline the timing of the research effort including writing up and submission, including key dates for seminars, drafts, final submission etc. Include a Gantt Chart, as shown in the ‘example’ below:

<table>
<thead>
<tr>
<th>Project Activity</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop project methodology</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Submit research proposal</td>
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<td>23</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Submit revised proposal</td>
<td></td>
<td>27</td>
<td></td>
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<td>Background Reading</td>
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<tr>
<td>Basic interpretation (eg in SeisWorks etc)</td>
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<tr>
<td>Oral Presentations – Curtin University</td>
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<td>27</td>
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<tr>
<td>VSP analysis</td>
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<tr>
<td>Coherence Cube analysis</td>
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<td>Attribute analysis</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academics Review Progress / Student must submit 1 page statement of progress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write Dissertation/Report/Article etc</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Seminar presentations – Curtin University</td>
<td></td>
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<td>21</td>
<td></td>
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<tr>
<td>Submit FIRST printed draft of Dissertation</td>
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<td>23</td>
<td></td>
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<tr>
<td>Submit FINAL printed version for marking</td>
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<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Submit FINAL electronic version</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27</td>
</tr>
</tbody>
</table>

• References

These need to be in standard SEG format as defined in any January Issue of Geophysics or in –

• Length

Honours proposals should be a maximum of three (3) A4 pages which includes title page and references with a font size not less than 12pt, and use single line spacing.
DEPARTMENTAL PRESENTATIONS OF HONOURS AND MSc COURSEWORK RESEARCH PROJECTS

The Department holds Honours seminars in May as a means of checking that all Honours projects have got underway satisfactorily. These seminars, presented by Honours students, are not for credit. They are compulsory but no marks are assigned. This is our way of seeing that everything is under control. In case of difficulties, projects may need to be re-defined.

All presentations will be in PowerPoint mode and by computer projection. The standard departmental template is located on the following geophysics shared folder: ‘U:\GEOPHYSICS\10 - PUBLIC\TEMPLATES and LOGOS’. All sponsors must be acknowledged.

Presentations will be of ten minutes duration, with a few minutes allowed for discussion.

The following is a suggested format, but it is not compulsory. The ten minute time limit is strict, but other slides may be used within this time limit.

1. Title of project, student name, supervisor and sponsor(s).
2. Background to the project. General area of research.
3. Specific problem or issue addressed by the project.
4. Proposed actions.
5. Anticipated outcomes.
6. Preliminary results, or any other work carried out to date.
7. Important dates and schedule of actions (work calendar).

Note: Projects may now be rather different from those originally proposed. If your project title has changed, the new title should be lodged with the Departmental Secretary after acceptance by the meeting.
APPENDIX C

GUIDELINES RELATING TO EXAMINATION OF DISSERTATIONS AND GRADING OF HONOURS AWARDS

1. EXAMINERS FOR DISSERTATIONS

1.1 The Head of Department (or nominee) shall appoint at least two examiners for each research project and/or dissertation and their assessments will be averaged. The student’s supervisor shall be one of the examiners.

1.2 Each examiner shall prepare a report indicating whether the general criteria set out in Paragraph 2.1 below have been satisfied and indicating the recommended grade of the award for the dissertation units or that the candidate should be failed. Examiners must assess numerically each marking criterion.

1.3 Reports of the examiners shall be presented to the Head of Department who, in the event of a disagreement between the examiners, shall appoint a third examiner.

2. CRITERIA FOR ASSESSMENT OF DISSERTATIONS

2.1 General

In reporting on the grading of dissertations written after completion of a research project, examiners shall base their recommendations on the following criteria –

<table>
<thead>
<tr>
<th>Student Name:</th>
<th>Criteria</th>
<th>Weight</th>
<th>MARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abstract quality</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Introduction, motivation for reader</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Conclusions comply with objectives</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Technical quality</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Writing systematic, flowing, clear and easy to understand</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Formatting and referencing correct?</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Special notes (initiative)</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Department presentation quality</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Validity of results</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Critical analysis</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Technical difficulty</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

**FINAL THESIS MARK IN %:** 100%

2.2 Award Level

Examiners shall have regard to criteria to be met for the different grades of award for the dissertation as follows:

First Class Evidence that the student has excellent scientific skills; a demonstrated capacity to interpret data and make logical deductions; report approaching publication standard; excellent research potential.

Upper Second Class Good literature review and presentation of data; interpretation shows some originality; evidence that the student has demonstrable intellectual capacity and research capability.

Lower Second Class Good presentation and interpretation of data; evidence that the student has clearly not demonstrated a capability for originality in research.

Third Class Adequate data but poor presentation; no significant interpretation of data; poor general presentation.

Fail Dissertation deficient in quantity and quality of data; substandard presentation.
3. **DETERMINATION OF FINAL GRADE OF AWARD**

3.1 **Marking of Dissertations**

3.1.1 If a dissertation is considered by the examiners to be of First Class Honours standard, the student shall be awarded a mark of 80% or more in each of the dissertation units.

3.1.2 If a dissertation is considered by the examiners to be of Upper Second Class Honours standard, the student shall be awarded a mark of between 70% and 79% in each of the dissertation units.

3.1.3 If a dissertation is considered by the examiners to be of Lower Second Class Honours standard, the student shall be awarded a mark of between 60% and 69% in each of the dissertation units.

3.1.4 If a dissertation is considered by the examiners to be of Third Class Honours standard, the student shall be awarded a mark of between 50% and 59% in each of the dissertation units.

3.1.5 If a dissertation is considered by the examiners to be of lower than Third Class Honours standard, the student shall fail in the dissertation units and be awarded a mark below 50% in those units.

3.2 **Final Grading**

3.2.1 The recommended grade of the award or the failure of the candidate shall be determined by the Head of School on the basis of the examiners' reports and the candidate's performance in the coursework units, for submission to the Board of Examiners.

3.2.2 It is a condition precedent to the granting of any award that the student shall have met all course requirements.

3.2.3 A student shall be awarded First Class Honours if the work during the year, and the dissertation, is rated 80% or more.

3.2.4 A student shall be awarded Upper Second Class Honours if the work during the year, or the dissertation, is rated from 70% to 79%.

3.2.5 A student shall be awarded Lower Second Class Honours if the work during the year, or the dissertation, is rated from 60% to 69%.

3.2.6 A student shall be awarded Third Class Honours if the work during the year, or the dissertation, is rated from 50% to 59%.

3.2.7 A student shall be failed if the student Course Weighted Average is less than 50%.

3.3 **Confirmation of Grading**

3.3.1 Consistent with University policy the Chairperson of the Board of Examiners should forward recommendations on students for the award of degrees with honours for confirmation by the Deputy Vice-Chancellor.

3.4 **Grading of Masters by Coursework and Postgraduate Diplomas**

3.4.1 Individual subjects are graded in the same way as for the BSc (Honours) program. However, there is no equivalent to First Class, Second Class etc. as an overall grading.
These notes are the prime information source for the format of BSc Honours dissertations in the Department of Exploration Geophysics. Where these notes do not cover some aspect specifically enough, use Anderson and Poole (2001) as a supplementary source.

Also, these notes do not cover the dissertation in the form of a paper. For the formatting of a paper, students should follow the instructions for authors of ‘GEOPHYSICS’. These instructions can be found at the SEG website at: http://www.seg.org/resources/publications/geophysics/instructionstoa.

Please also note that in the preparation of your dissertation, you should NOT copy text from other theses or published works, nor should you copy geological settings or diagrams or any other information from prior work in the region of the research. Reference to prior work must be written in the student’s own words and only to the extent that it is necessary and must be properly referenced each time it is referred to.

The dissertation is organised in three parts
- Preliminary Pages,
- Body of the Report,
- The End Part.

PRELIMINARY PAGES

The preliminary pages include everything before the start of Chapter 1. They are numbered with Roman Numerals, except the Title Page (page i, which carries no printed number). The following sections are not necessarily included in every dissertation.

1. Title page (page i)
2. Dedication (optional)
3. Abstract
4. Acknowledgments
5. Table of Contents with page numbers
6. List of Figures with page numbers
7. List of Tables with page numbers
8. List of Maps with page numbers
9. List of Appendices
10. Foreword (not normally necessary)
The dissertation is to be printed single sided on A4 paper, double spaced in 12 point Times New Roman font. To provide for binding, the left margin needs to be 4.0 cm wide, the right 2.5 cm. The typing needs to start 2.5 cm from the top of the page, leaving a margin of 1.5 cm at the bottom. The following instructions are to be followed for the Preliminary pages.

1. The Title Page

The Title Page is page i, but does not carry a printed number. The title must be carefully chosen to be concise, yet it should include key words relating to the subject and the message of the dissertation. You might start by writing down the key words by which your dissertation may be classified, then composing a title around those. Your dissertation will eventually be put in the University Library. Computerised searches on titles will rely on the title having the appropriate key words included in it. Make sure that your dissertation title is one that can be found.

The title is not a sentence; and may differ from the original title in your Research Proposal. Make sure that once you have selected a title, register it with the Departmental Secretary, who will also assign you a Report Number.

2. Dedication

This is an optional one page; it should be brief and centred in the page.

Examples of dedications in recent Geophysics Department dissertations:

<table>
<thead>
<tr>
<th>DEDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>To my beloved brother Peter IfeanyichukwuOkoye and to the memory of his late twin brother Anthony IfedilichukwuOkoye. This work is also dedicated to my beloved father Chief P.N. Okoye for his constant support and encouragement during my years of study.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>To my beloved wife Dan Zhang and our son Tong and daughter Shan. To my beloved grandparents, parents and sisters.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>To my dear wife GiGi, with whom I have found green pastures, still waters and a new happiness.</td>
</tr>
</tbody>
</table>

Few of us ever complete our studies without the support of loved ones, friends and relatives. The Dedication is kind of private, and you do not need to explain anything to the rest of the world if you don’t want to.

If you find this kind of thing too sentimental, then leave it out. Maybe you will consider your acknowledgments stated elsewhere to be adequate.

3. Abstract

The Abstract is the dissertation in miniature. Its optimal length is one and one half pages. It should cover the following:
• Statement of the problem or issue addressed in the dissertation.
• Brief statement of the work done.
• The outcomes and conclusions arising from the work.
• There should be no references in the Abstract; the Abstract is ‘stand alone’.

4. Acknowledgments

Many projects in this Department are supported by externally derived funds, and their source must be acknowledged. Perhaps your friends helped you with field work. You may have been receiving a scholarship, or you may have been given time off work by your employer to complete your studies. Whether you realise it or not, your supervisors usually put much more time into devising projects, supervising and editing than is apparent. They may have given you one of their pet ideas to research, instead of waiting until they had time to do it themselves for their own credit. Take care not to leave out of this section reference to anyone or anything of significance deserving of acknowledgment. To ignore them is very poor form.

5. Table of Contents

The Table of Contents may commence with Chapter 1, omitting reference to the Preliminary Pages numbered with Roman Numerals. Alternatively Preliminary Pages with Roman Numerals may be included, but the Title page (number i) is never included in the Table of Contents.

Make absolutely sure that the Chapter headings are exactly the same as in the text. If they seem too long in the Table of Contents, then shorten them in the text. Where you have used numbered sub-sections, then these need to be listed in the Table of Contents, and indented. Your word processing package may have facilities for automating this.

Example:

<table>
<thead>
<tr>
<th>CHAPTER 3 DEVELOPMENT OF THE ELECTROMAGNETIC RESIDUAL CONCEPT</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Small Loop (Dipole) Frequency Domain Surveys</td>
<td>49</td>
</tr>
<tr>
<td>3.1.1 EM Response of 3-D targets</td>
<td>50</td>
</tr>
<tr>
<td>3.1.2 Detectability of a target response</td>
<td>54</td>
</tr>
<tr>
<td>3.1.3 Reduction of the layered Earth response</td>
<td>57</td>
</tr>
<tr>
<td>3.1.4 Model data</td>
<td>60</td>
</tr>
<tr>
<td>3.2 Large Loop Transmitters</td>
<td>85</td>
</tr>
</tbody>
</table>

Keep the page numbering continuous, right through to the end, including References and Appendices. Do not use more decimal subdivisions than in the above example.

For example 3.1.4.2 is not recommended!

6. List of Figures

The Figure Captions will take the following form;

Figure x.y Followed by the Figure title.
This is then followed by one or more explanatory sentences to enable it to be understood in 'stand-alone' form.

x is the chapter number, and y is the number of the figure within that chapter. The figure title is not a sentence. Figures are numbered within each chapter only, and not within the sections of chapters. Thus you will not use Figure x.y.z.

In the List of Figures, only state the Figure title, not the entire figure caption. Page numbers are given as for Chapters.

For example:

<table>
<thead>
<tr>
<th>Figure 6.4 Azimuths for the square source/receiver configuration.</th>
<th>102</th>
</tr>
</thead>
<tbody>
<tr>
<td>(This is the fourth figure in Chapter 6.)</td>
<td></td>
</tr>
</tbody>
</table>

7. List of Tables

As with Figures, each Table will have a title. Tables are numbered within each chapter in a similar way to figures. A page number will be listed also in the List of Figures.

8. List of Maps

It is recommended that a list of maps be avoided by listing all maps as Figures. However, a list may be necessary where large maps are placed in a separate pocket at the end of the dissertation. This is not recommended, as they are very awkward to copy, should an extra copy of the dissertation be required. The entire dissertation should be printed on A4 sheets unless it is absolutely impossible.

BODY OF THE REPORT

The Body of the Report consists of the Chapters, starting with Chapter 1 (probably called Introduction), through to the last chapter (probably called Conclusions). These are numbered with regular numbers, which may be centred at the bottom of the page. A running chapter heading is very useful, and may be included as an option.

1. Chapters

Each new chapter starts on a new page. Printing must be on one side of the paper only.

Example: starting on a new page, centre the heading, double spaced as follows:

<table>
<thead>
<tr>
<th>Chapter 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COMPUTATIONAL DETAILS</strong></td>
</tr>
</tbody>
</table>

Many computer programs were written in the course of this research. This chapter outlines some of the techniques employed in them. Selected program listings are given in Appendix E.

2.1 Velocity Functions in Anisotropic Media
Further sub-divisions may be considered necessary,

For example:

3.2.1 **Transversely isotropic media**

As previously noted, do not go to more than two decimal divisions and all numbered subdivisions need to be included in the Table of Contents at the front of the dissertation.

The level of capitalisation for each heading should be reduced at each sub-section. Keep this consistent throughout the dissertation.

Should it be necessary in the text of a chapter to refer the reader to another section or chapter, either Section 3.4 or Chapter 3.4 may be used for example. Note that Section and Chapter are capitalised where they are the name of a part of the dissertation. Otherwise no capital letter is needed.

Example: in Chapter 4:

The theory developed in this chapter is based on the fundamental principles outlined in Chapter 3.2.

2. **Figures**

Each figure must be on a separate page, placed after the first quote in the text. **Do not include figures in the body of the text.** Figures are numbered within each chapter.

For example:
Figure 3.5 is the fifth figure in Chapter 3. Captions are to be underneath each figure and to be in the following format:

**Figure x.y** Figure title (not a sentence)
Then follows one or two explanatory sentences so that the figure can be understood in stand-alone form.

Do not use section sub-divisions for figure numbering.

Example: Figure 5.3.2 should not be used.

The figure title must correspond exactly to that given in the List of Figures at the beginning of the dissertation. Try to give each figure a distinctive title. If figure titles appear to be similar in the Table of Contents, this will be the cause of some confusion.

Make sure that axes on graphs are labelled, and that there are enough labels to enable the reader to work out what it is all about, without having to try to find the point in the text where reference is made to the figure.

Good Example:

Third figure in Chapter 4.
Figure 4.3 Ray paths in a two layer model of the Taylor Sandstone.
Due to the focussing effect of the structural boundaries of the model, the illumination of the reflector in the zone marked AB is not strong. This is the reason why AB appears as a shadow zone on synthetic sections.
Bad Example:

<table>
<thead>
<tr>
<th>Figure 4.3 Ray paths</th>
</tr>
</thead>
</table>

When a figure is referred to specifically in the text use a capital ‘F’ since it then is the name of a specific figure, otherwise use a lower case ‘f’.

For example:

<table>
<thead>
<tr>
<th>Selected ray paths are shown in Figure 4.3 where it can be seen that zone AB is not strongly illuminated. Elsewhere in the figure, densely spaced rays indicate strong illumination.</th>
</tr>
</thead>
</table>

Where no figure number is stated, no capital is needed for the word ‘figure’.

Often figures such as maps and so forth are reproduced from some other source. Be sure to acknowledge that source with a suitable reference such as ‘(from Krey, 1978)’. Make sure that the reference is also listed in the list of References at the end of the dissertation.

Figures may be upright (portrait) or turned on their side (landscape). The figure caption needs to be below the figure, so that both can be read without having to rotate the page back and forth. Similarly labelling orientation on the vertical axes of figures needs to be kept consistently orientated throughout the dissertation, to avoid the necessity of the reader having to twist the book one way then the other when reading it.

Make sure that everything in each figure can be read and understood. That is, either make the printing big enough to read, or delete it. There is no use presenting the reader with information which cannot be read or understood.

Make sure that legends are given where needed, especially where colour coded sections are used on a map or diagram. Subsequently someone may wish to photocopy the dissertation for personal study reasons. Colour may be wonderful in the original, may be not so good when copied in black and white. Do not go overboard on colour as it is expensive to print. Some additional cross-hatching or other device may be just as good, and furthermore can be photocopied in black and white.

3. Tables

Tables are numbered within each chapter, as for figures. They should be placed on separate pages, as for figures. Each will have a number and a title.

Sometimes, it is acceptable to put a small Table in the body of the text, but recognise that it is often difficult to distinguish it from other sentences in the text. In these circumstances, a border around the Table will help considerably. When in the body of the text, the Table title should come first. When on a separate page, like a figure, the title of the Table should be placed at the bottom.

THE END PART

This consists of:
- References,
- Appendices.

Page numbering continues on from the end of the last chapter.
1. References

The Department of Exploration Geophysics has adopted the referencing format of the Society of Exploration Geophysicists and the Australian Society of Exploration Geophysicists. Referencing standards are published each year in the January issue of Geophysics. A good summary is given in Appendix M of Sheriff (1991). This format must be strictly adhered to down to the last comma, colon and full stop.

Following on from the last chapter, a list of references is given in alphabetical order under the heading References. If an author or group of authors has more than one publication in your reference list for any particular year, distinguish them by adding a letter after the date.

Example: Okoye and Uren (2000a) and Okoye and Uren (2000b).

All references must have been referred to in the dissertation. References cited in the text must appear in the List of References at the end of the dissertation.

The guiding principle is ‘can you locate the reference from the details given?’ Once you have encountered an incompletely specified reference in someone else’s writing, and you have been unable to find it to read for yourself, you will understand why a strict referencing format is adopted.

2. Referencing within the text

The two main ways to cite references are the direct and indirect method. The direct method is as follows.

Example:
‘Sheriff (1991) is the main reference for geophysical terminology’.

The indirect method is as follows.

Example:
‘The variation of reflection arrival time because of source-point-to-geophone distance is known as normal moveout (Sheriff, 1991)’.

If there are two authors, both are mentioned.

Example:
Okoye and Uren (2000a).

If there are three or more authors, use the first author name followed by ‘et al.’.

Example:
Telford et al. (1990) or (Telford et al., 1990).

Don’t forget that ‘al.’ is an abbreviation, and is followed by a full stop. However, et is not an abbreviation, and is not followed by a full stop.

Where a number of references are given at the same time, separate them with semi-colons.

Example:
Popular texts on exploration geophysics include Dobrin and Savitt (1988); Parasnis (1997); Telford et al. (1990).
If a book is referenced, rather than a journal article, give the page number as well.

Example:
‘Dobrin (1973, page 104) gives an incorrect equation......’.

In defining a referencing convention, it is not possible to cover all possibilities. The main criterion is ‘Can the article or thing referred to be found from the information you supply to the reader?’ You will get the readers (examiners) offside very quickly if they cannot get hold of the reference through lack of information or incorrect information.

Double check that there is a one-to-one correspondence between references cited in the text and those in the list of references. Actually go through the dissertation with a pencil when it is finished, and tick them off in the Reference List as a final check that all those mentioned have been listed.

3. Appendices

These are labelled Appendix A, Appendix B etc. Page numbering continues on from the previous section.

Each appendix should be self contained. There should be a title page stating the title, and what is in it. If an appendix is long, there needs to be a Table of Contents for it.

Figures and equations need to be numbered within each Appendix.

Example:

Figure A.3 is the third figure in Appendix A.

Similarly equation (B.5) is the fifth equation in Appendix B.

References cited in the Appendices are listed in the References.

4. Special Appendices

Sometimes there is a need to make a pocket at the back of the dissertation to hold maps or discs. Such pockets are not recommended because of the inconvenience in binding. However it is recognised that such things may be important to the scientific content of the dissertation. Consideration should be given to the creation of a ‘Special Appendix’, which is not bound with the dissertation. Limited copies can be supplied to Examiners and others on request. Then one is not faced with the additional bother of special bindings etc.
REFERENCES

Anderson, J. and Poole, M., 2001, Assignment and dissertation writing: John Wiley & Sons, Australia, Ltd.


ADDITIONAL INFORMATION
for
BSc Honours Dissertation and MSc Research Projects

DISSERTATION INSTRUCTIONS FOR A PUBLISHED PAPER

The following instructions are taken from the web site of the Society of Exploration Geophysics (SEG) and would be applicable for a paper to be published in the journal Geophysics, which is the leading journal for publications in Exploration Geophysics.

You should follow these instructions or consult with your supervisor should you believe that publication in a different journal would be appropriate.

The intention of writing a paper designed for publication is not specifically, in the Honours program, to proceed to submission for publication. The intention is to give practice in the written style and format for publishable papers. So your dissertation does not have to be submitted to a journal.

Your dissertation may comprise only the designed publication but may also contain introductory material which outlines the area of study which your paper will add to. Publishable papers are usually succinct in style and will reference material which has been published previously and so introductory material may be presented as a pre-appendix to your ‘paper’.

WRITING ABOUT GEOPHYSICS

Write to inform. Before beginning to write, organize your material carefully. Include all the data necessary to support your conclusions, but exclude redundant or unnecessary data.

Choose the active voice more often than the passive. The passive usually requires more words and sometimes obscures the meaning. Use the first person, not the third person; for single-author papers, the usage of I is preferred, but we will be accepted as well.

Prepare a first draft that includes all the data, arguments, and conclusions that you had planned to cover. Then edit your manuscript carefully. Ask yourself whether the reader will find the text clear and the figures thoroughly integrated with the text. Go through this process at least twice, preparing a new draft each time.

When you are satisfied, ask a colleague — preferably someone not well acquainted with the subject matter — to read your draft. Be prepared for criticism. If one reader does not understand parts of your text, others will have the same problem. Remember, you are thoroughly acquainted with your subject, but your reader is not.


For details on style and usage, such as capitalization, punctuation, etc., refer to the University of Chicago Press’ The Chicago Manual of Style, 15th edition.

The dictionaries you should use are Webster’s Third New International Dictionary and Merriam-Webster’s Collegiate Dictionary, 11th edition.

The Encyclopedic Dictionary of Applied Geophysics, fourth edition, by R. E. Sheriff, is SEG’s standard for terms particular to geophysical technology. It also contains the preferred (SI) units and abbreviations for units. A revised version of the fourth edition was published in 2006.
ORGANIZATION OF A SCIENTIFIC PAPER

A scientific paper can be divided into sections: title, abstract, introduction, methods, results, discussion, conclusion, acknowledgments, appendices, and references. There is some flexibility in labeling these components, but they should be clearly identifiable and should follow in order.

**Title page:** The title is a label, not a sentence. Choose as few words as possible to describe the contents of the paper adequately. Use proper syntax. The first word should be significant and helpful both for classifying and indexing the paper. Company names should not be included in the title. If the title is longer than 38 characters, you must provide (on the title page of the paper) a shortened form of 38 characters or fewer to appear as a running head above alternate pages of the published paper.

List the authors on the title page by full names whenever possible. **Please be absolutely sure you have spelled your coauthors’ names correctly. Be sure also to use the form of the names that your coauthors prefer.** Include only those who take intellectual responsibility for the work being reported, and exclude those who have been involved only peripherally. The author list should not be used in lieu of an acknowledgments section.

**On the title page, also include the authors’ affiliations, including e-mail addresses, and the dates of submission of the original paper and of the revised paper.**

**Abstract:** Please pay particular attention to the preparation of your abstract; use the material in this reference as a guide. Every manuscript other than a discussion must be accompanied by an informative abstract of no more than **one paragraph** (200 to 300 words). The abstract should be self-contained. **No references, figures, tables, or equations are allowed in an abstract.** Do not use new terminology in an abstract unless it is defined or is well known from prior publications. SEG discourages the use of commercial names or parenthetical statements. The abstract must not simply list the topics covered in the paper, but should (1) state the scope and principal objectives of the research, (2) describe the methods used, (3) summarize the results, and (4) state the principal conclusions. Do not refer to the paper itself in the abstract.

Remember that the abstract will be the most widely read portion of the paper. Various groups throughout the world publish the abstracts of Geophysics. The abstract must be able to stand alone as a very short version of the paper rather than as a description of the contents. Readers and occasionally even reviewers may be influenced by the abstract to the point of final judgment before the body of the paper is read.

**Introduction:** The purpose of the introduction is to tell readers why they should want to read what follows the introduction. This section should provide sufficient background information to allow readers to understand the context and significance of the problem. This does not mean, however, that authors should use the introduction to rederive established results or to indulge in other needless repetition. The introduction should (1) present the nature and scope of the problem; (2) review the pertinent literature, within reason; (3) state the objectives; (4) describe the method of investigation; and (5) describe the principal results of the investigation.

For additional guidelines, see J. F. Claerbout, 1991, “A scrutiny of the introduction”: The Leading Edge, 10, 39.

**Methods:** The methodology employed in the work should be described in sufficient detail so that a competent geophysicist could duplicate the results. More detailed items (e.g., heavy mathematics) often are best placed in appendices. For complex mathematical articles, authors are strongly encouraged to include a table of symbols.

**Results:** The results section contains applications of the methodology described above. The results of experiments (either physical or computational) are data and can be presented as tables or figures and analyses. Whenever possible, include at least one example of recorded data to illustrate the technology or concept being proposed. Case-history results are usually geologic
Selective presentation of results is important. Redundancy should be avoided, and results of minor variations on the principal experiment should be summarized rather than included. Details appearing in figure captions and table heads should not be restated in the text. In a well-written paper, the results section is often the shortest.

**Discussion:** The discussion section should be separate from the conclusion section. If they are combined, the copy editor of your manuscript is instructed to ask you to separate them. This can result in delays in production. See below for a description of the conclusion section.

**Conclusion:** The conclusion section should include (1) principles, relationships, and generalizations inferred from the results (but not a repetition of the results); (2) any exceptions to or problems with those principles, relationships, and generalizations, as indicated by the results; (3) agreements or disagreements with previously published work; (4) theoretical implications and possible practical applications of the work; and (5) conclusions drawn (especially regarding significance). In particular, with reference to item (1) above, a conclusion that only summarizes the results is not acceptable.

The conclusion should not include figures, tables, equations, or reference citations.

**Figures and tables:** Each figure and table must be called out (mentioned) sequentially in the text of the paper. Each figure must have a caption, and each table must have a heading. Captions and headings should be explicit enough that the reader can understand the significance of the illustration or table without reference to the text.

Each illustration and table should be given an Arabic number and should be referred to by that number in the text. In the caption and text, spell out the word *Figure* and capitalize it when a number follows it. In table headings and text, spell out the word *Table* and capitalize it when a number follows it.

**Footnotes:** Footnotes should be avoided unless absolutely essential and then should be held to a minimum. All footnotes introduced in the text of a paper should be numbered consecutively from beginning to end of the manuscript. In the manuscript, each footnote must be inserted at the bottom of the page where the reference appears.

**Acknowledgments:** If the author includes an acknowledgments section, it is placed after the conclusion and before the appendices (if any) and reference list.

**Appendices:** An appendix should not be cited in the text in such a way that the appendix is essential to a reader’s understanding of the flow of the main text. See section 1.82 in *The Chicago Manual of Style*, 15th edition, for further explanation of the content of an appendix. Each appendix should be called out (mentioned) sequentially in the text of the paper by name, i.e., “Appendix A.”

Each appendix should have a substantive title such as “Appendix A — Mathematical Considerations.” In each appendix, number equations and figures beginning with 1: A-1, B-1, etc.

Appendices are placed after acknowledgments and before the reference list.

The reference list is placed last in a manuscript, after the acknowledgments and appendices (if any). See the “References” section under “Manuscript Preparation” below for details on reference style.
ATTACHMENT NO. 1

THE EFFECTS OF VARIABLE SANDSTONE PROPERTIES ON STRESS-INDUCED SEISMIC ANISOTROPY

Report No.: GPH ?/15
[or if you are a Master of Science student insert......
    Report No.: GPM ?/15]

by    John A. Citizen
BSc. (Geophysics) Curtin

This report is presented as part of the requirement for the unit/s
ERTH4001 Geoscience Honours Dissertation, totalling 100 credits
[or alternatively Geophysics Project – Thesis Parts A&B, totalling 75 credits]
in the BSc (Honours) Science from Curtin University.
[or alternatively MSc Science – Geophysics Major from Curtin University.]
The work is the result of supervised research; however, the report has been prepared by the student who is solely responsible for its contents.

DEPARTMENT OF EXPLORATION GEOPHYSICS
Curtin University

November 2015
How to Write the Dissertation

The dissertation is a form of communication from the researcher to the reader. The ability to communicate research outcomes is an academic requirement of Honours research. A page limit of 70 pages has been imposed on Honours dissertations in the Department of Exploration Geophysics, excluding appendices. If you are enrolled in another Department, find out what they require.

Writing may commence at any time throughout the year, but during August, you should start to write in earnest, even though your research is probably still incomplete. How is it possible to do this? Well your reference list will almost be complete by this stage! Why not start there.

Dissertation writing is a big job, so do not underestimate the time and effort needed to complete it. Consult with your supervisor, who will most likely be one of your assessors. It is your dissertation, but take advice.

References

Right from the start of the research project, you will have been collecting an alphabetical list of references in a computer file; these should be put into strict SEG format. After each entry, short notes can be made for your information when writing the dissertation. For example, it might be noted that on a certain page, a very useful diagram may be found for later inclusion in the dissertation.

When it comes time to write the dissertation, copy this file and delete the commentary. This then becomes the nucleus of the References for the dissertation. More may still be added, and those that are not cited in the final document should be deleted.

Planning the Dissertation Structure

Many dissertations can be accommodated within the following chapter headings.

1. Introduction
2. Background Theory
3. Investigations Carried Out
4. Analysis of Results
5. Conclusions and Recommendations

Of course, no two dissertations are alike, so feel free to modify the above general recipe. For example, Chapter 2 in a dissertation involving mapping of diamond prospect, may be titled...
Getting the Story Right

Make a list of the outcomes of your research findings. What do you wish to say you have found as a result of your work? Group your research outcomes into three to five categories. You might start off with a lot of small findings. Revise these to see if they can be generalised. You do not want a multitude of small points which will confuse the reader. Group them.

When you started off, you wrote a Research Proposal. Go back to your original Research Proposal, and see how well it corresponds with what you actually did. If it does not match, don’t panic, it is too late to change now anyway. Often the course of a research project may change during the year for many unforeseen reasons. However, you will still have been working in the same general area. You must go with what you have ended up with. The following sections will tell you how to handle the situation.

Chapter 1

1. Identify the general field of your research. Make it very general. Gather statistics to support the significance of this field to science, our economic future, quality of life, balance of payments, food production, export earnings, employment and so forth. The Australian Bureau of Statistics, State Government Departments and agencies are usually good sources of this kind of information. You need to show that you are aware of the importance of your work to the wider community. See an example of a good introduction in Appendix A. You have to try hard to get the interest of the reader right from the start.

2. Identify a specific issue or problem which has demanded your attention. This must be a problem for which your research outcomes provide a partial solution, or provide greater understanding. Let your outcomes decide the problem. Ignore your initial issue or problem, which you stated in your Research Proposal, if your research has drifted away from that. You then need to say that there is a ‘need for an investigation’ into the issue which your work is addressing now, or some such words.

3. Propose a work program basically to cover what you did. This is not being dishonest. The dissertation is not the story of your research work. We do not want to read a chronological account of your trials and tribulations. If your problems or failures have a bearing on the problem, and add understanding to the issue, then they may be relevant. Generally it is not a good policy to publicise your failures.

A dissertation is a logical document. You need to know the significance of your research findings and conclusions. This is best done by defining the problem or issue to which they pertain. So express the work program as a need for some work to be done rather than what you proposed to do when you started. Think about this a lot, and get over the guilty feelings of dishonesty that may come to an objective scientist such as yourself. Put it the other way around. Did your research fill a need? It must have. It was not a useless bit of time-wasting, surely! What need or issue did it address? You are in the communication business now!

4. Now that you have got over that, make a list of the things that would need to be done to address the specific problem you have identified. Note the careful choice of words ‘need to
be done’. Of course they will match reasonably well what you actually did. Build in plausibility, logical process and success right from the start! The entire dissertation must relate to this need. Anything which does not relate in some way is irrelevant as far as the dissertation is concerned.

5. Be careful to define the scope of your proposed investigation. If there is some aspect that you are not going to do, then declare up front why you are not “going there”. Give reasons for restricting the scope of your investigation. Maybe the task not being attempted is too large for the time frame of the proposed research (two semesters). Facilities might not be available. Cover yourself in case an examiner might think you have not done a thorough job. This is a perfectly legitimate practice.

6. Do not even hint at the results or outcomes anywhere in this first chapter. To do so will be to trivialise the work you just spent a year doing. The work must be done in response to a need. Express the need first.

7. To end up Chapter 1, list the other chapters and what they generally contain. No results or outcomes!!!!! You may want to tell all, but Chapter 1 is not the place to ‘spill it’.

Chapter 1 is a key chapter in the dissertation. Remember ‘The end is in the beginning’. Think back to the last ‘unfunny’ joke someone told. A good joke-teller will set the joke up properly and the punch-line will relate to the original set-up. An unfunny joke will often not, and so it will “fall flat”. This success of a joke depends much on the way it is told. Your dissertation is no joke, but the way it is told is significant in explaining the merits of your work.

It is vital that the Dissertation Title, the Abstract, Chapter 1 and the conclusions in your last chapter tie together. That is why you should start your planning by writing down the outcomes first, then working backwards. The Abstract is done last, so don’t worry about that now. All of these must match the Dissertation Title. If it does not, then match the Dissertation Title to these sections. That is, change the title. One way or other they must all go together, or else the reader will be confused by your writing.

Remember the following sequence for Chapter 1:
General area
Specific problem
Proposed work program
Briefly what the reader may expect in each of the later chapters, but no results

Each subsequent chapter should be well ‘signposted’ and linked. The beginning should indicate what follows in the body of the chapter, relating it to the purpose of the research. The end of each chapter should sum up that chapter, and point to the next one.

Some people will be unhappy with these recommendations. “We were told by Professor XYZ to list the outcomes in an Executive Summary”, you say. Well remember that you have the Abstract in which to state the dissertation in miniature. A dissertation is a logical document. If it does not carry a logical argument, then it is missing something. Without this aspect built in, it becomes nothing more than a consultant’s report, and not an intellectual study of a problem.

Many people feel the urge to include a sub-section in Chapter 1 called ‘Aims’ or ‘Objectives’. This is very dangerous. There is a grave risk that your aims or objectives will be expressed as being for example: ‘To carry out a gravity survey across the Darling Fault’. Such a direct goal just reduces the dissertation to a contractor’s exercise. To express it this way loses the logical aspects of the study making up your research project. It is far better to state the need or motivation for doing the work. If you state the need or the issue in the way I have recommended, then the conduct of a gravity survey for example, becomes the response to this
need. There may have been other possible lines of action considered in response to the stated need. Perhaps you considered them and ruled them out for various reasons. This then becomes part of the decision process and logical development of the dissertation.

The Last Chapter

Usually the last chapter is titled Conclusions and Recommendations. The conclusions must arise from the work you did. Do not introduce any new material. Do not include conclusions which you cannot substantiate, even if they are readily accepted by the scientific community. Conclusions are not results. The conclusions must be answers to, or contributions to the initial issue or question(s) raised by you in Chapter 1. It sometimes helps to re-state the issue at the beginning of the last chapter. Make absolutely sure that it matches the issue stated in Chapter 1.

Keep the conclusions fairly short. If you have many conclusions, consider grouping them together. By all means explain your conclusions. Don’t just list them. Relate them to the research issue stated in Chapter 1.

Recommendations

Often a piece of research will raise more questions than it answers. Thus the recommendations you make for further research are very useful for researchers following you. Do not make your recommendations too wide-sweeping. Keep them directly arising from your work. There is a danger here. You do not want to provoke the reader to ask ‘If it was so important, then why was it not followed up as part of this work?’ You do not want your suggestions to imply that you did not finish your investigation properly. Thus it is very important to give brief reasons as to why you did not follow up these matters yourself. This is yet another matter that must be tied to Chapter 1, where the proposed research must be tightly defined. Common reasons stated for narrowing the scope of the research might be:

- There was insufficient time to look at this aspect
- It was beyond the scope of the project as originally defined
- Facilities were not available to do it.

While it is usual to state recommendations, it is not absolutely necessary.

Chapter 2

It is difficult to outline specifically the middle part of a dissertation, as this will be very much related to the nature of the individual project. However some general comments may be made about Chapter 2. One of the requirements of your research project is that you must show evidence of reference reading. Chapter 2 is a good place to show a lot of this.

Chapter 2 often is the place where a review of current knowledge is given. In a theoretical project, it might consist of background theory. Do not just transcribe pages from a text book. By all means refer to a text book. But the main excuses for repeating readily available theory could be:

- To provide a statement in consistent notation (if the source is scattered and in inconsistent notation).
- To provide a concise statement on which to build later mathematical developments.
- To gather the relevant theory together for the convenience of the reader.

Feeble excuses will be apparent to the reader.
CHAPTER 2

3-D ELECTROMAGNETIC NUMERICAL MODELLLING

In this chapter, Maxwell’s equations are used as the basis for computing the EM response of a 3-dimensional body embedded in a layered Earth. The theory presented here is not new and can be found in a number of geophysical papers (Raiche, 1974; Wwidelt, 1975; Hohmann, 1975) and textbooks (Harrington, 1961; Ward and Hohmann, 1991; Kaufman and Keller, 1983) in one form or another. The variety of approaches used in the literature may lead to some confusion so a brief overview of the derivations useful for the remainder of the dissertation is presented. The complexity of the derivations is limited by considering a 3-D body located in the lower part of a two-layered Earth, although the method is applicable to Earth models having any number of layers. The integral equation approach to numerical modelling is used to compute the EM response of an arbitrarily shaped three-dimensional body. The results of numerical modelling will be used to test the enhancement procedures developed in later chapters.

Alternatively Chapter 2 might be a geological review of the project area, where references to current knowledge are given and summarised.

The following example is taken from a MSc dissertation by Wilson (1999).

Dissertation title: Effectiveness of Earth Conductivity Mapping of the Regolith for Dryland Salinity Studies, Wallatin Creek, Western Australia.

CHAPTER 2
SECONDARY SALINIZATION WITHIN THE DRYLAND AGRICULTURAL REGION OF WESTERN AUSTRALIA

2.1 Introduction

This chapter reviews the processes commonly contributing to secondary salinization within the dryland agricultural areas of Western Australia, also known as the “wheatbelt”. The geological setting and weathering processes therein, the origin of the salt load and its storage within the sub-surface and changes that have occurred within the landscape that are directly contributing to salinization of the land are reviewed. Current research into the management of salinized land and methods to ensure its eventual remediation are discussed.

2.2 Geology

The farming region referred to as the “wheatbelt” in this work is defined by the Darling Range as its south-western boundary, its approximate north-eastern boundary being the 300mm isohyet (Street and Engel, 1990). See locality map in Figure 1.1.

The Archaean Yilgarn Craton mainly ......

In Chapter 2 a brief discussion of the relevant geophysical techniques applicable to the geological characteristics of the area might be given. This might be the place where you argue the specific line of action to be followed in the field.

The form and content of Chapter 2 is dictated by the nature of the dissertation you are writing.

Results are rarely given in Chapter 2.
Chapters 3 to (n-1)

The remainder of the chapters up to and including the second last, outline the work done and the results obtained.

Each chapter needs to relate to the stated research. While you do not need to hammer the issue, some repetition is quite acceptable where you are explaining why a certain line of action was followed. The theme and purpose of the research must permeate your writing.

How To Get Going When You Are Out of Ideas

A most informative book by King (1955) claims that there are three things preventing us from writing good informational prose.

i) Lack of knowledge of our subject.
ii) Lack of special label words (jargon).
iii) We may have our information organised in a confusing way.

The first two points should present no trouble. Sheriff (1991) should be used for jargon, and the Australian Macquarie Dictionary for other spelling. The third point will probably be the major problem. We tend to write in a way which is logical to us. This is good of course, but rather than logical (which it must be), our writing must be psychological. That is, the reader's thoughts must be created, guided, and satisfied.

King (1955) suggests the use of words as an aid to thought - "the language of thinking". Pick a word from your title, or chapter, and play a word association game by asking yourself questions. eg. how, why, where, why etc. What other words are suggested?

Example: "A Single Fold Three Dimensional Seismic Survey"

Seismic - sound, acoustics, sources, receivers, transmission, reflection, absorption, ground roll, P/S waves, vibration, frequency, wavelength .......

Three Dimensional - volume, two dimensional arrays, offsets, common mid points, receiver/source geometries, speed of working, computer programs, etc.

Fold - Stacking, stacking bins, vertical stacking, CMP stacking, noise attention, migration, variation with depth, etc.

Try to suggest to yourself all the things which might occur to the reader who might be angry and frustrated because you ignored them. Having noted down all the ideas and thoughts which are useful, your problem will be then how to select words to cover the most appropriate of these points economically by implication, thus avoiding expansive and boring prose.

You will find it so much easier if you get all important figures in final form (or near final form) before you start the final write-up. It is then much easier to write a "story" around the "picture".

As soon as you find the need for a figure, generate it without delay. As figures are produced in the research that make a point, clearly label and date them and set them aside.

To help you later, label your sources clearly so that you can verify and return to the data if necessary, and give due acknowledgment if it is someone else's work.
The Reluctant Reader

It is a mistake to assume that your reader will start at Chapter 1, or to think that he will be either interested or willing. Professional people are often so overworked, that they cannot possibly read everything properly that comes their way. Thus proper setting out will help such people get the information which they want without having to read it all.

For example:

Example:

A typical overworked reader (Academic Assessor?!) might read as follows:-

"What's this thing?" - An Honours Dissertation by Blogs, S.B.
"What's it about?" - reads title.
"Hmm. What's he done?" - reads abstract.
"Interesting conclusions" - reads final chapter. Glances through the reference list.
"He seems to have gone into this in some detail" - Rapidly flips through the pages in reverse order, looking for pictures, maps, graphs, etc, whilst fighting the urge to put it in the out-tray. This is why figure captions need to include brief explanations.

Our reluctant reader will probably then end up at the table of contents, and his future actions will be guided by his prior knowledge, degree of interest in the research topic, and the extent of other demands on his time. He may then give up, read bits of some chapters, or even start at Chapter 1!

The Abstract

The Abstract is the dissertation in miniature. It needs to state the problem or issue, say what you did about it, and give the results and conclusions derived from your research. The wording needs to be carefully chosen. It is usually the first part of a dissertation someone will read. Hence you need to capture the attention of the reader, or else it may be the only part that will be read. When writing the Abstract, it is a good time to check the compatibility of your dissertation title and your conclusions.

In the following example, the writer (Hunt, 2000) gives the background and states the issue. He says what was done, and gives the outcomes.
Example:

Dissertation title:

*Causative Factors in the Evolution of Saline Seeps in the Brockman River Catchment*

**ABSTRACT**

Large areas of the Australian landscape are affected by dryland salinity. This is a process whereby naturally occurring salts are concentrated at the surface by rising groundwater. The rise of groundwater levels is mainly attributed to the clearing of native vegetation. This problem incurs a great cost on the country’s economy, as dryland salinity development results in the loss of agricultural production, damage to infrastructure and environmental degradation.

Geophysical techniques have been applied to the study of dryland salinity only in the last decade. Airborne geophysics is becoming widely used, as the fast acquisition of data allows entire catchments to be surveyed. The most commonly used methods are magnetics, radiometrics and electromagnetics. Magnetics is used as an aid to mapping geological structures. Radiometrics is used to map geology, and soil types. Electromagnetics is used to map the lateral and vertical variations in ground conductivity.

The Brockman River catchment is an agricultural area in the Darling Range, 60 Kilometres northeast of Perth, Western Australia. The area lies within the Chittering Metamorphic Belt, and is part of a laterite plateau that has been dissected by rejuvenated drainage. Saline seeps that have formed on hillsides there in the last five years are threatening productive farmland. There is a need to investigate the causative factors in saline seep development, and to see if geophysical techniques are useful in such a study.

A project site was chosen which was representative of the salinity problem in the area. The problem at the site is manifested by the discharge of saline groundwater on one side of a valley, below an extensive laterite plateau.

The area was studied by both geological field mapping and geophysical surveying. The field mapping showed that the drainage in the valley follows structural lineaments caused by faulting. Geophysical surveys of magnetics, radiometrics and frequency domain electromagnetics (Geonics EM31) were conducted in the valley containing the seeps. Magnetics and time domain electromagnetics (Geonics EM 47) were performed on the plateau, which is the local groundwater recharge area.

The study found that there were several causative factors present at the research site. These were: shallow, irregular bedrock beneath the seepage site, change to a bedrock of lower hydraulic conductivity and faults that block the flow of groundwater. The most effective geophysical tool was the EM 31, which mapped salt affected and salt-prone areas. The radiometrics method was useful in mapping geology and salt accumulation, but the acquisition method was slow and the results were affected by non-geological factors. The magnetic method is often considered essential in salinity investigations, but it was not as useful as expected, as some of the structures seen in the field were not detected. EM 47 proved to be effective in mapping a saline aquifer and showing the depth of the regolith, but it could not be used close to the hillside seeps because of steep topography. It was concluded that geophysics was a valuable tool in the study of salinity, but should be used as part of an integrated scientific approach.
Use of the First Person

Many traditionalists insist on the dissertation being written in the third person. They consider this approach to seem more objective. I tend to agree with this, with a major difference. When an assessor is evaluating a dissertation, he or she will want to know what you did. However, when written in the third person, it is often hard to tell if the writer did what is being reported, or whether it was done by someone else. To get around this problem, use the first person when you are claiming credit for doing something. Don’t overdo it. Use the first person sparingly, or else it will lose its impact. Clever use of the first person will get the reader’s attention, and remove any ambiguity as to who should get credit for the work. Be guided by your supervisor on this point.

The following example is taken from a PhD dissertation in which the writer studies well known existing programs, and compares their performance with a program written by himself. When he says “My analytical BESSEL program” there is no doubt as to who should get the credit.

Example from Sykes (2000)

| EM3D uses very short filters (61 points for $J_0$ and 47 points for $J_1$) and is consistently very | fast. MARCO is comparatively slow but becomes more efficient as the number of field points | increases. My analytical BESSEL program was able to compute the field components in less | time than the digital filter programs in all cases. |

Assembling the Dissertation

The sooner you can get the chapters together, in a folder say, the better. Even if the figures are not complete, put pencil sketches in their place to get a good idea what the finished product is likely to look like. You can then continually upgrade the dissertation, or complete the sections remaining to be done, inserting them into the assembled document.

Final Checks

With the dissertation in semi-completed form, you will be able to get others to proof read it.

**Mechanical checks**

References
Figure numbers
Table of contents, and page numbers
Are all figures and tables referred to in the text?
Do figures appear on the next available page after they have been cited in the text?
Are headings given in consistent font, case and page positioning?

A much more exhaustive list of checks is given by Anderson and Poole (2001).

**Logical checks**

Are the title, abstract, Chapter 1 and final chapter consistent?
Do the conclusions arise from the work done?
Are the conclusions answers to the original issue or problem?
The final check

Get one of your friends to read the dissertation. It should be easily followed by someone who is technically competent, but not necessarily an expert in the field. You would learn something too by checking a dissertation for someone else.

You have a big job ahead of you, so don’t leave it until the last minute. Read Anderson and Poole (2001) and “Good Luck”.

References


Wilson, V.C., 1999, Effectiveness of earth conductivity mapping of the regolith for dryland salinity studies, Wallatin Creek, Western Australia: MSc dissertation, Department of Exploration Geophysics, Curtin University.
APPENDIX A

CASE STUDY

This case study of a first chapter is taken from Hunt (2000). In the first section, the writer identifies the general issue, and its importance. At the end of this section he points to a specific area for research. The general issue is too big to be addressed completely in a single research project.

Dissertation Title:

CAUSATIVE FACTORS ON THE EVOLUTION OF SALINE SEEPS IN THE BROCKMAN RIVER CATCHMENT

CHAPTER 1
INTRODUCTION

1.1 The Cost of Salinisation in Australia

Australia is paying a high price for its agricultural prosperity. The wholesale destruction of the native environment by past generations has enabled the country to become one of the world’s premier agricultural producers. This success has, however, come at a cost. The clearing of the land set in motion a devastating chain of events, which is only now beginning to show effects, and is disturbing all aspects of the rural landscape.

Dryland salinity is defined as the hydrological process that results in the build up of salt in soil and groundwater systems (Evans, 1993). This process has been initiated, in the majority of cases, by the clearing of native vegetation.

The salinity problem has been determined by the State Salinity Council (2000) to be the “greatest environmental threat facing Western Australia”. There are already 1.8 million hectares affected by salt, and the estimated annual cost to the Australian economy through loss of agricultural land productivity is one billion dollars (George and Green, 2000).

Land that was once arable has become saline, resulting in reduced crop yields, and in severe case, total loss of productivity. Salinity could affect up to 30% of the State’s agricultural land in the future if salinity management is not carried out. There are other significant costs, such as the impact on the State’s water resources, the biodiversity of our native wildlife, and the infrastructure of rural towns.

The water supply for the majority of Western Australia’s population comes from dams in the Darling Range. An increase in salinity in rivers that feed into these dams would render the dams unsuitable for use as domestic supplies.

The dryland salinity problem has put many native species at risk of extinction. The development of salt-affected land changes the balance of an ecosystem, as salt-intolerant flora and fauna are replaced by other species. This change in the natural ecology may result in the displacement of other sensitive species. The low-lying wetland areas of W.A. are home to many unique species of animals. These wetlands are most at risk of destruction from rising groundwater.
The onset of salinisation has had a devastating effect on the infrastructure of rural towns. Rising groundwater levels affects roads, bridges, buildings and parkland. The life-time of sealed roads has been reduced by 75% in some areas (State Salinity Council, 2000). The management of this problem is very expensive and affects the quality of life in rural towns.

The dryland salinity problem affects the entire wheatbelt region of Western Australia. The problem is similar in expression and cause across the whole of this region, due to the similar nature of soils and landforms of the Yilgarn Craton.

The BrockmanRiver has been identified by the Western Australian Water Resources Council as a possible domestic water supply source for the Perth area. This would be achieved by the construction of a dam at the Brockman’s junction with the AvonRiver. An increase in the salinity of the BrockmanRiver would cause the destruction of this resource (Evangelista and Associates et al., 1998).

For these reasons it is of vital importance that the salinity problem be addressed, and remediation plans put in place. To do this, a means of defining the nature of the salinity problem must be established. Geophysics can play an important role in this field of study.

In the next section, the writer homes in on a specific problem for investigation.

### 1.2 Salinity in the BrockmanRiver Catchment

The BrockmanRiver catchment is located close to Perth, in the southwest of Western Australia. It is a high rainfall area, with land use mainly small-scale farming, with a significant area occupied by native bushland. The area is part of a dissected peneplain, with drainage flowing southwards. The location of the BrockmanRiver is shown in Figure 1.1.

The area is affected by secondary salinity. The problem has been emerging in the previous few decades, and it is affecting that clearing of land for agriculture has caused the problem. The salinity problem is manifested in numerous discrete seepages, which mainly occur on the slopes of the steep-sided valleys in the region.

The BrockmanRiver catchment is a unique environment. The dryland salinity problem here manifests itself differently from that in other Australian catchments. It is important to find a specialised method for defining the causes of saline seep formation in this area. For this reason it is necessary to undertake a study of the saline seeps in the BrockmanRiver catchment. A single area of saline seeps was chosen for investigation, as this site was considered representative of the problem in the area.

Now that the writer has defined the area in which study is to be concentrated, he then sets about creating a work program. First he poses a few question, and then he proposes a work program. At the same time, he is imposing limits to the scope of work he will undertake (already has undertaken in truth). As you write, you must think of it from the reader’s point of view.
1.3 Can Geophysics Provide Useful Information?

Can Geophysics be used to define the causes of salinity in the BrockmanRiver catchment? Geophysics requires the presence of sufficient physical contrast in the area, to allow it to be used to map geological features. Geophysical methods have been used with success in many wheatbelt catchments with salinity problems. We want to know whether geophysics can assist in developing a groundwater model for the project site. There are additional factors in the BrockmanRiver catchment that need to be considered. Is the location, with complex geology and rugged topography suited to study by ground geophysics? If it is not, what then is the method that is suited to the area?

He now sets about defining the work program.

1.4 Research Program

In order to determine the causative factors in the formation of the salines seeps, and to evaluate the performance of geophysical methods in their study, it is proposed to:

- Perform a literature review of the current understanding of the dryland salinity problem in Australia, and the use of geophysics in the treatment of this problem.
- Study all of the relevant information on the project area such as geological maps and aerial photographs.
- To survey the area and perform high-resolution geophysical surveys of magnetics, radiometrics and EM31 over the valleys containing the seeps.
- To direct additional methods such as EM34, EM47 and self potential at areas where groundwater may be preferentially channelled, or blocked, in order to more closely define the problem and the underlying geological factors that are causing it.
- To interpret the three main datasets, in order to define the conditions at the site (soil type, geological structure and seep occurrence).

Now having proposed a work program, which coincides with what was previously done, a short section follows on the general form of the dissertation.

Note: There is no hint or suggestion of any results at this stage!

1.5 Structure of the Dissertation

Chapter 2 of this dissertation describes dryland salinity and the methods that are used in the study of the problem. Chapter 3 describes the environment and the specific nature of the problem at Chittering (Brockman River Catchment). The geophysical program undertaken in the project is given in Chapter 4, along with a brief description of geophysical methods and equipment used. Chapter 5 deals with the geological interpretation of the individual datasets, and this information is brought together in the conclusions in Chapter 6, in which a groundwater model is proposed, and the geophysical methods are appraised.