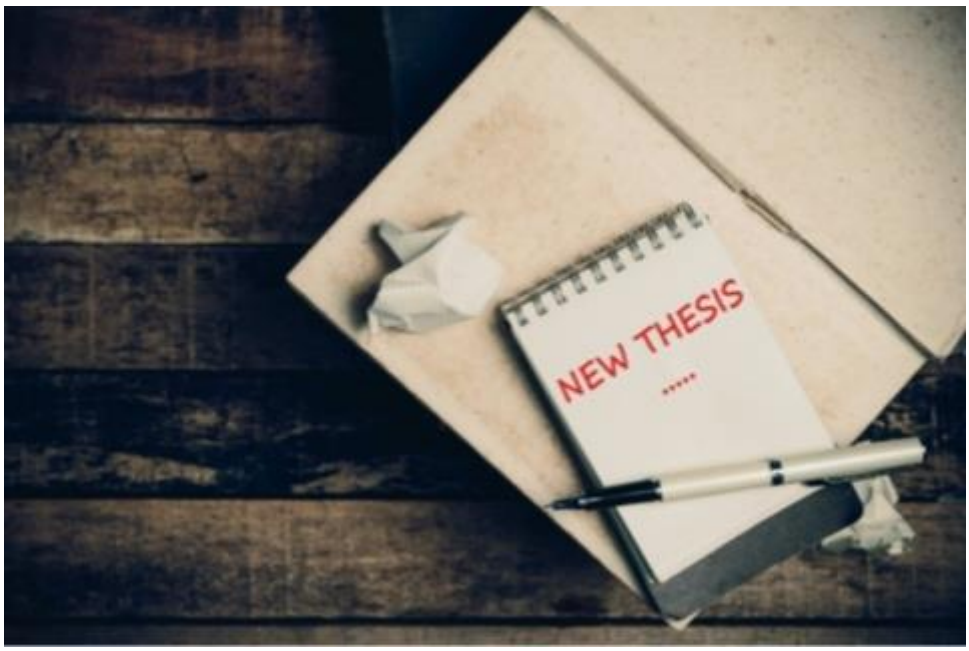
Guidelines for preparing and writing the Graduation Internship Report or Bachelor Thesis

Fontys
University of Applied Sciences



During the last semester of the fourth year of the bachelor program Electronic Engineering the student must show he/she can function at the level of a graduate student by completing a graduation project. An important part of the graduation internship is writing the graduation report or Bachelor Thesis.

The guidelines in this document apply to the graduation internship. So, the guidelines are for preparing and writing the graduation internship report in the last semester of the fourth year. The "Content" on page 3 and 4 could be a guideline index for your own report. It is NOT meant as a rule for the setup of the content of your report. Each graduation project is different in approach and carried out work and so all projects will be reported in a different and unique way.

Each chapter is discussed in the belonging chapter of the Content in this document. A guideline for the report main text length 25 to 40 pages: in this way you show you are able to distinguish main issues from side issues. The language is preferably English (Dutch is also allowed of course depending on your company requests).

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Cover Page

The cover is the first thing the reader sees of the report. It is therefore important that the cover looks professional and attractive.
On the cover:

- The title of the project (report) and the subtitle (if applicable)
- The name of the author (s) and the date and place of appearance
- In the middle is a functional artwork very desirable.

The title must be concise and clear: use preferably telegram style, as you also find in headlines. A "catchy" title is a plus, but certainly not a condition.
The subtitle has an informative function: he explains what was not said in the title anyway and what is needed to get a good image of the subject.

Title page

The title page lists all kinds of information necessary for Administration and Documentation, such as your student number, and the name and address of your internship company.

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University of Applied Sciences

GRADUATION / INTERNSHIP REPORT

FONTYS UNIVERSITY OF APPLIED SCIENCES

ENGINEERING

Data student:	
Family name , initials:	
Student number:	
project period: (from – till)	
Data company:	
Name company/institution:	
Department:	
Address:	
Company tutor:	
Family name, initials:	
Position:	
University tutor:	
Family name , initials:	
Final report:	
Title:	
Date:	

Approved and signed by the company tutor:

Date:

Signature:

Preface/Foreword

The foreword can be written in the 'I' form. The foreword mentions the framework in which the report is written, and in which company (name and type) the project is executed. It gives an indication about the nature of the contract and when the project is done by two students (a duo-stage), it says who did what and who has which chapters written (exactly, with name and title). This is the only place where the division is discussed; so you should not put the name of the writer above or below each individual chapter.

In the preface you can thank anyone (the company tutor, the university tutor, family, friends) for their guidance and help during your study. In this case e.g.: *""Thank you Wiely van Groningen for your helpful feedback on my first versions of these guidelines"*.

The preface is no chapter, it has no number, and therefore no sections and no figures.

Summary

The informative summary is maximum one page long, and summarizes the entire project (report). You can only write the summary after you have completed the report. It says at what company you've performed the project and what kind of company that is. Further, there was the initial situation, what problem existed, and therefore which project assignment was given. Then you write down which approach you have followed and what the results were, and last thing your conclusions and recommendations.

In the summary are no references to other parts of the report; don't go too much into details and make sure the summary is independent of the rest of the report. The summary is e.g. for the managers in a company who want to have an overview of your work in a short time frame (10 minutes) and should be able to make up their mind based on your report summary.

Just like the foreword the summary is not a chapter, and therefore has no number and no sections. In the summary are also no figures or enumerations.

(for Dutch reports also an English version is required)

So again:

A. The summary must be independent of the rest of the report.
B. Introduce the main question.
C. The approach you have followed.
D. Clearly indicate the results and the outcomes.
E. Always include conclusion, recommendation and evaluation.
F. Do not refer to other parts of the report in your summary.
G. Do not get too technical.
H. Do not include any figures, charts or tables.

Table of contents (TOC)

In the TOC you mention only those components that are included after the table of contents in the report, so not the preface, and certainly not the TOC itself. It is the most straightforward if the contents fit on one page, but this should not go at the expense of readability.

Use correct numbers for the chapters and sections, and go no further than three levels, for example 4.2.2.
The Introduction is always Chapter 1, and the Conclusions and Recommendations are always the last chapter. Everything that comes before and after is a fixed part of the thesis, but no chapter.

All chapters should have informative titles as sections. Reading the table of contents should give a good picture of the logical structure of the report.
Use correct numbers for the pages: the title page is page number 1, the preface is page number 2, and the TOC is page number 3 – but the numbers are not put on the pages before the summary. If we assume that your table of contents is one page long, than so is the first numbered page of your thesis the summary on page 4. You have to work with “sections” in MsWord to accomplish this!

All annexes must be started with name and number. The numbers are either Roman numerals (I, II, III, etc.) or uppercase letters (A, B, C, …). The page numbers of the attachments are usually not listed in the table of contents. However, it is important that the reader can find the correct attachment easily.

Use simple Headers (e.g. only file name and a page line) and Footers (page line and page number)

List of abbreviations

List of figures/tables

All should have a number and text. All should be referred to within the main text!

1. Introduction

The introduction is the first chapter of your report, but is certainly not firstly written, because at the beginning of your project you know too little to be able to write a good introduction! But after a few months it seems you know too much: you forget that the reader is not working on the project together with you and that things that cut cake for you, for him in the meantime are new and unknown. To avoid this (or restoring this) it is good to meet a fellow student to ask to read your introduction. If he does not understand, you have to re-write it in an understandable way!

The introduction should give the reader the first, global information about the project (apply the hourglass approach, from broad view, to detail and to broad again). The reader is prepared for what is to come. There must therefore be at least information about **the company, the problem, the project assignment and the relevance of the project assignment,** and already a short indication of **the followed strategy**. But the reader must be encouraged to read the report; so start with a catchy opening sentence, for example a compelling question, an equation, or a spectacular story (anecdote). If you start with a quote, you must ensure that you know something of the background of that quote, so you are prompted during the session with a brief explanation.

In the last paragraph of the introduction: tell the reader what he can find in every chapter. As follows: *Chapter 2 provides information about the company*, *Chapter 3 gives all the details about the project assignment, Chapter 4 discusses ….*

This part, the **"signpost",** is thus the last paragraph of this chapter. Together they are a maximum of one page long and although the *Introduction* is a chapter, the same rules apply here as for the *foreword* and *summary*: no figures, no sections, no graphs.

NB 1 Both the Summary and the Introduction are often called as first read, and thereby determine the expectations that cherishes the reader. Don't forget that here you get the chance to make a first good impression!

2. About the Company

2.1 background information

2.2 Organogram

This chapter provides the reader in everything he needs to know about the company: when is it founded and what is the history of the company as it is now, where they are located, what is the market position, how many people work there, what they make and for whom (products or services, markets, customers) and tell about their mission and vision. It is important not to give too many details on one hand, for example about the genesis of a company, and on the other hand be not too vague about the company's products; for example: "company X makes communications equipment" contains too little information. Give a few examples! In this chapter also make it clear from where you explain your works; you do this first in words and then in an organization chart**.**

3. Project description and assignment

3.1 Project background
3.2 Problem description
3.3 Assignment
3.4 Project goals
3.5 Project scope
3.6 Boundary condition
3.7 Project approach:
3.7.1 Development phases
3.7.2 Verification method (V-model)

In this chapter you give all the details about the project assignment, in clear sections. The reader comes to know everything about the following areas:

- What is the initial situation? What is there to miss? Why is that a problem? What are the unintended consequences?
- What is the purpose of the project? What does the client achieve with it? What is the desired end situation?
- What is, by virtue of the two previous points, the precise assignment description?

In this chapter you clearly describe what does belong to and does not belong to your assignment. So if the company wants you to use a certain design method or apply a specific technique (FPGA, microcontroller, protocols, etc.) the reader can find it here.

If the assignment in the course of the project changes, this will be explained in this chapter.

So again:

A. Successful problem definition, means clear goal of the project
B. Defining boundaries of the project. Boundaries are more conditions that must be met. E.g. if there is enough budget.
C. What is out of scope? For example, out of scope is: sw development is not part of the project.
D. Make sure that the final results/solutions could be verified if possible

4. Research

4.1 Research objectives

4.2 Main and sub questions

4.3 Research approach

4.4 Results

4.5 Conclusions

The research aspect of your assignment must clearly come into your report. A rule of thumb is that your internship for at least 20% and for a maximum of 80% must consist of research and development. We speak not of scientific research, but of applied research. In this part of the report you describe surveys, information gathering methods, used literature and other resources and comparisons of possible methodologies, techniques, tools and solutions (if applicable) for your project.

Start the chapter with a short “Intro” (few sentences) to tell the reader what you will do in this chapter.

Avoid ambiguities, be anywhere specific. Example: "This led to delays" is much too vague. In such a case, you write: "forty percent of customers has, in the past year, received the invoice only five months or longer after the purchase."

Finalize every main chapter with an “outro”: tell the reader what he has to learned from this chapter

In this chapter, as in all other chapters, you refer to the References at the end of the main part of the report (before the Attachments) in the IEEE way. Apply MsWord “Bibliography” for this.

Make sure that you write all in your own words to avoid plagiarism!

5. Specification

5.1 functional requirements

5.2 non-functional requirements

Make sure:

A. Clear definition of the test cases and their outcome
B. MoSCoW model for realistic overview
C. Can be described in a SRD (System Requirement Document) and attached
D. In this chapter you describe the outcome of the SRD

6. Concept selection

6.1 Criteria

6.2 Concept selection matrix

6.3 Conclusion: decision

The criteria are taken from the SRD and you come up with specifications and possible solutions. One may apply a morphologic card to depict the possibilities.

7. System Design

Here you can e.g. introduce or start applying and the top-down structured design of your project.

7.1 Architecture

7.2 Block diagram

7.3 Module description

A. Can be described in a SDD (System Design Document) and attached to the report
B. In this chapter you describe the outcome of the SDD

8. Detailed Design/ Module Design

A. Can be described in a MDD (Module Design Document) and attached to the report
B. In this chapter you describe the outcome of the SDD regarding the design (calculations, simulations, schematics, software)

9. Realization

A. Can be described in a MDD (Module Design Document) and attached to the report
B. In this chapter you describe the outcome of the SDD regarding the building of the prototype
C. The test plan and test report of the MDD can be used as source

10. Verification and validation

10.1 Test set-up

10.2 Test results based on your test plans

A. The test plans are already described in the development part of the V-model. Now it is time to implement these plans and come up with your test report document (TRD).
B. Specify the test items again for your system test and acceptance test
C. Describe the test results

11. Result analysis

A. Start with the acceptance/rejection criteria
B. Discuss the outcomes of all the tests done
C. Finalize with a pass/fail

12. Conclusions

The reader should be able to understand this chapter even when he, immediately after he has read the introduction and chapters, has skipped *all* intermediate: make sure you connect the content within the conclusion chapter!

The reader who has read the whole report, should encounter no new information in this last chapter, indeed: he must be able to predict what it says! In this chapter the results are compared with the initial assignment (requirements/specifications)

and conclusions are drawn. Do not draw conclusions that are not underpinned with previous mentioned results. Conclusions coming out of the blue are not acceptable!

Recommendations (could be a separate chapter) tell the reader what should be improved or still has to be done in order to complete the assignment

This last chapter has no figures or lists. The maximum length is one page.

13. Recommendations

In Recommendations one tells the reader what should be improved or what still has to be done to complete the assignment.

EVALUATION

This is not a chapter, and therefore has no number and no sections. Just like the *foreword or preface* the evaluation is a personal part of the report and you can write this component also in the 'I' form. You reflect on the experiences you have had during the project. You oversee the whole journey and you discuss what you've learned. You describe what you've found and what you remember as your most "teachable or valuable moments" i.e.: when did the error(s) or problem(s) occur and why; especially how you've solved the problems and again emphasize that!

This is not the place to settle outstanding accounts. But suppose there was a profound reorganization at your Department, where many people are transferred or dismissed, then of course this has influenced your work, and then you need to mention this. But do this carefully, without offending somebody.

Finally it is advised to take some time to look back at and evaluate your study. First compare your graduation time, subjects, needed skills, needed knowledge, etc. to that what you have learned at Fontys Engineering. Which subjects, courses, practical's and projects were helpful or even indispensable. Also you could advice how to change the curriculum of Fontys Engineering from every possible view point. Adding or deleting subjects and/or courses, change practical's, change the way of teaching, you name it. This will help Fontys Engineering to keep the curriculum updated and in that way Fontys Engineering is able to educate the engineer of the future!

To be clear: this part is not often written in (business) reports. But some universities do want this part to show your competences and your (positive) critical view on your education. Fontys Electrical Engineering is happy with this separate chapter as a learning experience for the study.

Bibliography (reference/literature list)

Locations of information you mention in the References/Literature List. The reader can feel a sense of the scope of your research. Make sure you mention recent information sources, in such a way that the interested reader may consult the same sources. You can call books, magazines and websites studied during your project.

At the mention of websites you write what website it is, of which company or institution, and if that is not known worldwide, give a brief explanation. Then you give the internet address, with specific mention of the Web pages. When applying the MsWord option for Bibliography all of this is included when inserting the data. Apply the IEEE form of referring.

Mind plagiarism: as a rule it says that the complete thesis report is your OWN work. For all quotes, sentences you have taken from sources should be clearly mentioned in the references but always written in your own words. Mind that all reports will be checked on plagiarism by Ephorus.

Attachments

A. Original assignment
B. Project plan
C. Originality Declaration
D. Confidentiality Declaration (optional)
E. SRD, System Requirements Document (optional)
F. SDD, System Design Document (optional)
G. MDD, Module Design Document (optional)
H. TRD, Test Report Document (optional)

All attachments are numbered with Roman numerals or with capital letters, and have an informative title (see p. 4 of these guidelines for entry in the *TOC*). The information in an annex supplements the report, but the reader must be able to read the main report (the report without the attachments) completely independently of the attachments.

One of the attachments of your report is your *Project Plan.*

During the project you probably write a large number of documents for the company (see p. 1 first subparagraph). It is expressly not intended that these documents are, all in their entirety, part of the *attachments*. Include only documents or portions of documents that are relevant for the reader who wishes to read additional information. So all attachments should be referred to within the main report chapters! A guideline could be a maximum of again 40 pages in total of attachments