

## Workshop

# Graduation Project

Writing the Project Documentation and Criteria  
for Formatting of the Design Project Report

Course Name: Graduation Project



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## TOPICS THAT WILL BE COVERED

- Structuring Reports
- Writing Abstracts
- Referencing Material
- Presenting Data
- Criteria for Formatting of the Design Project Report



## WHY TO DOCUMENT YOUR DESIGN PROJECT ? AND WHY IT IS IMPORTANT?

- Dissemination of ideas and results
- Good work could be ruined by a poor project report, that doesn't justify your practical work right.

## WRITING AND STRUCTURING REPORTS

- **Structure**
  - Title Page or Cover Sheet
  - Abstract
  - Acknowledgements
  - Content Listing
  - List of Figures and Tables
  - Chapter 1 – Introduction
  - Chapter 2 – Literature Review
  - Chapter 3 – Methodology (Design Requirement, feasibility and final implementation)
  - Chapter 4 – Result and Discussions
  - Chapter 5 – Conclusions

## ABSTRACT

*An abstract is a short summary of your completed design project. If done well, it makes the reader want to learn more about your design project.*

These are the **basic components** of an abstract in any engineering discipline:

- 1) Motivation/problem statement:** Why do we care about the problem? What practical, scientific, theoretical or artistic gap is your design project filling?
- 2) Methods/procedure/approach:** What did you actually do to get your results? (Design requirement, design content, design components and parts etc.)
- 3) Results/findings/product:** As a result of completing the above procedure, what did you learn/design/create?
- 4) Conclusion/implications:** What are the larger implications of your findings, especially for the problem/gap identified in step 1?

## CHAPTER 1

### The Introduction Chapter

This chapter should contain the following

- Overview
- Problem Statement
- Goal and Objectives
- Scope of the Project
- Outcomes and Benefits
- Facilities and Resources
- The method of the report - Describe the organization and structure of the report.



## CHAPTER 2: Literature Review

- Discuss the context and history of this general topic and describe what has been done in the past.
- Include literature search results for the OVERALL problem
- Include pros and cons of the existing solutions. Also motivate need for a new solution.
- Answer the question: What are the most important issues for this topic in terms of the goals of the project and the effects on society?
- Write about at least 5 of the following issues:
  - **Economic**
  - **Environmental**
  - **Sustainability**
  - **Manufacturability**
  - **Ethical**
  - **Health and safety**
  - **Social**
  - **Political**

## CHAPTER 3: Methodology

- It contains approaches to reach the goal, analysis of the problem and design of subsystems, test and evaluation of the designed components, and synthesis of the components to build the project.
- Present work plan for project phases (analysis, design, implementation and evaluation) and cost analysis in terms of expected effort and material.



## CHAPTER 3: Methodology

### Design Requirement

Specifications and requirements for the project:

- **Specify technical and non-technical characteristics.**
- **Give the detailed specifications** that served as the basis for the project
- **Consider aspects** such as potential users, cost, safety, user-friendliness, performance, compatibility with other things, functionality, acceptance, convenience, capacity, misuses, legal issues, standards or codes, availability, materials, productivity enhancement, entertainment, technology, and design methods.
- **Selection of design criterion:** Based on our specification, specify goals for performance, reliability, cost, code size, manufacturability, safety, societal factors (human interface, environmental factors, etc) and any other criteria relevant to the project.
- **Alternative solutions:** Explore alternative solutions. Evaluate alternative solutions based on situation description and design constraints.
- **Select the proposed solution with justifications.** Provide an overall architecture of the solution.
- **Functional decomposition of the project:** Explain the major functions required by our design. Figures and tables should be used to supplement discussion.

## CHAPTER 3: Methodology

### Feasibility Discussion

**Results of literature search:** Provide the options and justification for overall approach (hardware, software, choices of methods).

**Analysis:** Describe behavior of the system, data and requirements.

**Options and justification for each functional part:** Provide the options and justification of design approach and components or methods used in each functional part. Be sure to cite all of the literature used in our discussion.



## CHAPTER 3: Methodology

### Final Implementation

Presentation of final implementation:

**Describe the project and its functions** (include diagrams, code examples, and other figures in the body of the text and refer to any large engineering drawings, listings, etc. in the appendices in the body of the text).

**Discuss and present the calculations** used in the design of the project in the relevant subsections.

**Summarize repetitive calculations in tables.**

Also, describe

**Tools** used,

The way of **implementing the solution** and

**Solution requirements.**

## CHAPTER 4: Results and Discussion

This is the forth chapter of the project that deals with results and discussion.

It contains:

- **Design of experiments to evaluate** the system in laboratory environment and in real life situations,
- **Statistical evaluation** of the experimental data
- An **interpretive discussion of the results** and thoughtful evaluation of the design methodology adopted.
- **Discussion of the lessons learned.**



## CHAPTER 5: Conclusions

It includes:

- A restatement of the problem that gave rise to the report
- Brief statement of the problem, a description of the main features of the method omitting most of the details concerning subjects and measure
- A listing of main findings, and conclusions based on these findings.
- A summary of the design performance
- Recommendations, explaining subsequent action or posing specific questions for investigations. We may indicate as suggestions for further work, implications of what would we do and how we would continue if we had available time and opportunities.

## Reference Materials

### **Citing**

#### ***Citation***

Cite references in the text by name and year in parentheses. Some examples:

Negotiation research spans many disciplines (Thompson 1990).

This result was later contradicted by Becker and Seligman (1996).

This effect has been widely studied (Abbott 1991; Barakat et al. 1995a, b; Kelso and Smith 1998; Medvec et al. 1999, 2000).



### **Reference list**

Reference list entries should be alphabetized by the last names of the first author of each work. Order multi-author publications of the same first author alphabetically with respect to second, third, etc. author. Publications of exactly the same author(s) must be ordered chronologically.

### **Journal article**

Gamelin FX, Baquet G, Berthoin S, Thevenet D, Nourry C, Nottin S, Bosquet L (2009) Effect of high intensity intermittent training on heart rate variability in prepubescent children. *Eur J Appl Physiol* 105:731-738. doi: 10.1007/s00421-008-0955-8

Ideally, the names of all authors should be provided, but the usage of "et al" in long author lists will also be accepted:

Smith J, Jones M Jr, Houghton L et al (1999) Future of health insurance. *N Engl J Med* 965:325–329

### **Article by DOI**

Slifka MK, Whitton JL (2000) Clinical implications of dysregulated cytokine production. *J Mol Med*. doi:10.1007/s001090000086

### **Book**

South J, Blass B (2001) The future of modern genomics. Blackwell, London  
Book chapter Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York, pp 230-257

### **Online document**

Cartwright J (2007) Big stars have weather too. IOP Publishing Physics Web.  
<http://physicsweb.org/articles/news/11/6/16/1>. Accessed 26 June 2007

### **Dissertation**

Trent JW (1975) Experimental acute renal failure. Dissertation, University of California.

## **Organizing Appendices**

Materials that may be of interest or importance to some readers but are not sufficiently relevant to be included in the body of the report go to appendices.

There may be many appendices supplementing the report. Some material, such as computer printouts, may be so lengthy that placing it in the text would disrupt the reader's attention.

Students must discuss with their advisor(s) the need for appendices, carefully considering the value of the material they propose to include.

Appendices must be designated with a letter (Appendix A, Appendix B, etc) each starting on a fresh page, and a title. Each appendix must be listed in the Table of Contents. All appendices must meet the usual margin requirements.



## **REMINDER:**

The final report *must* address the use of appropriate engineering standards and include consideration of realistic constraints, as appropriate:

- economic
- environmental
- sustainability;
- manufacturability
- ethical
- health and safety
- social
- political

## **Final Report—Additional Guidelines (Continued)**

Related to font style, font size etc

Links





<b>Acknowledgements</b>	<b>Table of contents</b>
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<b>List of figures</b>	<b>List of tables</b>
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TITLE OF SENIOR DESIGN PROJECT

## 1. Introduction

It includes a clear explanation of goals of the project, the significance of studying the problem. It should orient the reader to the topic of the report by including the following:

- The problem - Explain the particular problem that is addressed in the report.
- The objective - State the assignment (what our project needs to accomplish to solve the problem).
- The method of the report - Describe the organization and structure of the report.

### 1.1. Title Paragraph

#### 1.1.1. Title Sub-paragraph

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#### 1.1.1.1. Title Sub-paragraph

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1

TITLE OF SENIOR DESIGN PROJECT

## 2. Literature Review

Discuss the context and history of this general topic and describe what has been done in the past. Include literature search results for the OVERALL problem and context rather than the options for component parts here. Include pros and cons of the existing solutions. Also motivate need for a new solution. Answer the question: What are the most important issues for this topic in terms of the goals of the project and the effects on society? Write about at least 5 of the following issues:

- **Economic:** effect of this topic on the economy in the past, possible cost of project development, cost of materials, target cost if project is marketed.
- **Environmental:** influence on the environment in the past, possible effects for future developments.
- **Sustainability:** product life cycle, future markets.
- **Manufacturability:** material availability, use of off the shelf versus custom components, special needs for hostile environments.
- **Ethical:** uses that could cause harm to society, ethical issues that someone working on this topic might encounter.
- **Health and safety:** positive or negative impacts on the health and safety of individuals or society for past or future applications in this topic.
- **Social:** relationship of this topic to social aspects of society such as education, culture, communication, entertainment.
- **Political:** relationship of this topic to political issues.

### 2.1. Title Paragraph

#### 2.1.1. Title Sub-paragraph

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TITLE OF SENIOR DESIGN PROJECT

## 3. Methodology

It contains alternative approaches to reach the goal, analysis of the problem and design of subsystems, test and evaluation of the designed components, and synthesis of the components to build the project. Present work plan for project phases (analysis, design, implementation and evaluation) and cost analysis in terms of expected effort and material.

### 3.1. Design Requirement (3 to 6 pages)

- Specifications and requirements for the project: Specify technical and non-technical characteristics. Give the detailed specifications that served as the basis for the project (interpretation of rules of a contest, interpretation of customer requirements, and interpretation of desired features; how they determine or constrain size, velocity, response time, cost, weight, etc.) Consider aspects such as potential users, cost, safety, user-friendliness, performance, compatibility with other designs, functionality, acceptance, convenience, capacity, maintain, legal issues, standards or codes, availability, materials, productivity enhancement, entertainment, technology, and design methods.
- Selection of design criterion: Based on our specification, specify goals for performance, reliability, cost, code size, manufacturability, safety, societal factors (human interface, environmental factors, etc) and any other criteria relevant to the project.
- Alternative solutions: Explore alternative solutions. Evaluate alternative solutions based on situation description and design constraints.
- Select the proposed solution with justifications: Provide an overall architecture of the solution.
- Functional decomposition of the project: Explain the major functions required by our design. Figures and tables should be used to supplement discussion.

#### 3.1.1. Title Sub-paragraph

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### 3.2. Feasibility Discussion (2-5 pages)

- Results of literature search: Provide the options and justification for overall approach (hardware, software, choices of methods).
- Analysis: Describe behavior of the system, data and requirements.
- Options and justification for each functional part: Provide the options and justification of design approach and components or methods used in each functional part. Be sure to cite all of the literature used in our discussion.

#### 3.2.1. Title Sub-paragraph

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TITLE OF SENIOR DESIGN PROJECT

### 3.3. Final Implementation (5-15 pages)

- Presentation of final implementation:
  - Describe the project and its functions (include diagrams, code examples, and other figures in the body of the text and refer to any large engineering drawings, listings, etc. in the appendices in the body of the text).
  - We might present the implementation by functional group. Discuss and present the calculations used in the design of the project in the relevant subsections.
  - Summarize repetitive calculations in tables.
- Also, describe
  - Tools used.
  - The way of implementing the solution and
  - Solution requirements.

4

TITLE OF SENSOR DESIGN PROJECT

## 4. Results and Discussion

This is the fourth chapter of the project that deals with results and discussion. It contains:

- Design of experiments to evaluate the system in laboratory environment and in real life situations.
- Statistical evaluation of the experimental data
- An interpretive discussion of the results and thoughtful evaluation of the design methodology adopted.
- Discussion of the lessons learned.

### 4.1. Performance Estimates and Results (2 to 5 pages)

- Present the estimated performance of the project (and how they were derived) based on the preliminary design (estimates to include speed, cost, power consumption, noise-immunity, ease of use, etc. depending on the project).
- Present the actual performance results. Discuss the results, compare with estimated performance and explain discrepancies. Evaluate performance with respect to legal, illegal, boundary and known cases.
- Compare results with those of other existing solutions.
- Include suggestions for design changes that would improve the performance of the project. Use graphs or other figures to show relationships when appropriate.

#### 4.1.1. Title Sub-paragraph

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### 4.2. Production Schedule (1-2pages)

Discuss the phases of the design and implementation of our project (Part charts may be appropriate in the discussion) Recommend any improvements that could have been made in the scheduling and planning.

#### 4.2.1. Title Sub-paragraph

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### 4.3. Cost Analysis (1-2 pages)

Tabulate component costs and compare to estimated cost and market cost where appropriate.

#### 4.3.1. Title Sub-paragraph

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### 4.4. User's Manual (1-3 pages)

Provide a user's manual for the operation and maintenance of the system designed in the project.

#### 4.4.1. Title Sub-paragraph

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## 5. Conclusions and Recommendations

It includes:

- A restatement of the problem that gave rise to the report
- Brief statement of the problem, a description of the main features of the method outlining most of the details concerning subjects and measure
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## 6. Reference Materials

Reference materials contain the bibliography (references) and appendices. They are paginated consecutively from the last page of the text. They must meet the same format requirements (margins, fonts, spacing etc) as the rest of the report.

### 6.1. Citing and Listing References

#### Citation

Cite references in the text by name and year in parentheses. Some examples:

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**Thank You**