Optimal Design Report Format for BME 4900

The purpose of the report is to fully document your design. It should be clearly written, and have sufficient analysis to support your project. Use the sections headers as described in this document—not following this format will result in a lower grade.

For equations, use Word’s equation editor. Use single line spacing throughout the report and make sure that pages are numbered.

Points for each section given in (## Points).

Optimal Design ## Report

Page One:

Title of Project
By
Student Names
Team No.

Client #
Client Contact: Name(s), Organization, Address, Phone Number.

1. Optimal Design Project ##

1.1 Introduction
The introduction should describe everything in the section. Provide an overview of the device and any highlights. This overview describes what the product does and how you are going to implement it. You should include block diagrams and figures here that describe the complete system. You can describe major components here and any creative innovations. Use headers to partition the section as indicated. Provide reasoning for the optimal design based on the three alternative designs.

One Page Minimum. (20 pts)

1.2 Subunits
This section provides a detailed description of each subunit. You should include block diagrams and figures here. Components should be specified and some technical analysis can be presented to support the project.

Each subsection should be a subsystem of your project. You should have diagrams and other figures in this section. Figures should be drawn in Visio or
Solidworks. Each part/device should be described with a section in which the following is covered: form, function, diagrams. Discussion on how you will test to subsystems should be included in each subunit, as well as how you will integrate the subunits into a complete device and any testing procedures.

You should choose an order of presentation, such as top to bottom that best meets your needs. Headings should be consistent, clear and standout.

Analysis or some other support (i.e., protoboard testing, etc.) must be provided in each subsection to show proof that the project will work. Use Multisim, Matlab, Solidworks, FilterPro and other software packages for verification.

10 Page Minimum. (60 pts)

2 Realistic Constraints
Based on the design, how are the following incorporated into the design project:

- Engineering standards
- Realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political.

2 pages minimum. (5 pts)

3 Safety Issues
Based on the optimal design, how is safety addressed (i.e., Electrical, Mechanical, Biological Hazards, Decontaminations, Chemical hazards, Radiation, Thermal, Biocompatibility, Host Reaction to Biomaterials). You do not need to discuss all safety hazards in the previous list, just those that are relevant to your project.

1 page minimum. (5 pts)

4 Impact of Engineering Solutions
Based on the optimal design, describe the impact of engineering solutions in a global, economic, environmental, and societal context.

1 page minimum. (5 pts)

5 Life-Long Learning
Describe any new material learned and techniques acquired.
1 page minimum. (5 pts)

6 References
List references using the style sheet below.

Style Notes

Writing Style

- Use simple and correct English, i.e., “use” not “utilize” or “usage,” “effected” not “impacted” (except for teeth). Remember, “data” is a plural word.

- Parameters are what you fix, variables are what you measure, e.g., “temperatures were set at 20, 30, and 40 deg. C. (parameters) and measurements were made of blood pressure and flow (variables).

- In describing portions of the paper, use the term “above” to refer to previous statements and “below” to indicate what is to follow.

- Use metric (SI) units and abbreviations. Leave a space between the last digit of a number and its units. Use scientific notation for numbers, with a leading 0 for numbers less than 1, e.g., 0.23 ml.

- If a commercial product is mentioned, include model number along with manufacturer, city and state (country).

- In general, do not use footnotes. For a sentence or two, just put the comment in parentheses. For a paragraph or two, use a side bar. Alternatively, include with references as endnotes.

- To use an abbreviation or acronym, first spell it out, and then follow with the abbreviation or acronym in parentheses. (This is not required for common units of measurement.) For plurals, do not use an apostrophe, i.e., use EEGs and 1990s, not EEG's and 1990's.

- “, et al.,” takes commas front and back, and one period; “, i.e.,” and “, e.g.,” take two commas and two periods.

- At the start of a sentence use “Figure 3”; within a sentence, use “Fig. 6” or “Figs. 8-10”.

- Use “2-D” and “3-D” for two and three dimensions.
**Mathematical Notation**

To avoid errors in editing and typesetting, authors should clearly identify subscripts, superscripts, Greek letters, and other symbols. Add margin notes or other explanations wherever necessary. It is especially important to distinguish clearly between the following terms.

- Capital and lowercase letters when used as symbols.
- Zero and the letter “O”.
- The lowercase letter “l,” and numeral one, and the prime sign (').
- The letters “k” and κ (kappa), “u” and μ (mu), “v” and ν (nu), “n” and η (eta).
- Bold type should be indicated for vectors and matrices.
- Italic type should be indicated for all text variables. If an equation is likely to be longer than the magazine’s column width, it is helpful to indicate the best places for the equation to be broken into multiple lines.
- Avoid ambiguities in equations and fractions in text through careful use of parentheses, brackets, slants, etc. Note that in text, fractions are usually “broken down” to fit on one line and confusion can result if terms are not properly labeled. The conventional order of brackets is {[( )]}.
- Use of the multi dot rather than the multiplication sign when multiplying by powers of ten in equations or text is at the author’s discretion.
- In your manuscript, put each equation on a separate line. If you number them, put the number in parentheses in line on the far right of the page.
- Lead into an equation by ending the previous line with a colon. Do not use a period or comma to end an equation.

**Units and Abbreviations**

The International System of Units (SI) is advocated for use in IEEE publications.

Unit symbols should be used with measured quantities, i.e., 1 mm, but not when unit names are used in text without quantities, i.e., “a few millimeters.”

If quantities must be expressed in English units, the SI equivalents should be given also in parentheses, i.e., a distance of 4.7 in (12 cm).

Most acronyms and abbreviations should be defined the first time they are used in text.

**References**

Each reference number should be enclosed by square brackets. In text, citations of references may be given simply as “in [1],” rather than as “in reference [1].” Similarly, it is not necessary to mention the authors of a reference unless the
mention is relevant to the text. It is almost never useful to give dates of references in text. Footnotes or other words and phrases that are not part of the reference format do not belong on the reference list. Phrases such as “For example,” should not introduce references in the list, but should instead be given in parentheses in text, followed by the reference number, i.e., “For example, see [5].” Sample correct formats for various types of references are as follows.

Books:

Periodicals:

Articles from published conference proceedings:

Papers presented at conferences (unpublished):

Technical reports:

References—Electronic Sources
The guidelines for citing electronic information as offered below subscribes to the International Standards Organization (ISO) documentation system.

Journal Articles:
Author, Title, Journal [Type of medium], volume (issue), pagination if given, (year, month). Available: Directory: File:
Example:

Material Obtained Through Loose-Leaf, Computer, or Information Services
References to material obtained through computer services or information services are treated like first references to original printed material except that the usual information is followed by the name of the service, the name of the service provider, and the accession or identifying numbers within the service.

Example:

Computer Programs and Electronic Documents
The ISO recommends that capitalization follow the accepted practice for the language or script in which the information is given.

Example:


“Work in progress” is not an acceptable reference. “Work in press” should be cited as completely as known. “Personal communication” should indicate complete name and mailing address of the informant. Journals or magazines with a single-word name are spelled out completely, e.g., Anesthesiology, Science. Abbreviations of journals and magazines are given in the International Standards Organization’s “International Standard ISO-4-1972 (E).
Documentation – International Code for Abbreviation of Titles of Periodicals.” The Reference in G-3 above is also an excellent source for journal abbreviations. Some common abbreviations used are:
Am = American
J = Journal
Trans = Transactions
Sci = Science
Int = International
Arch = Archives
Proc = Proceedings
Med = Medical
Engng = Engineering

NOTE: No periods are used in journal abbreviations. When in doubt, spell it out, and the copy editor will make the necessary abbreviations.