Final Report Format for BME 4900 and 4910

The purpose of the report is to fully document your project. It should be clearly written, and have sufficient analysis to support your project. The first part describes the report format for BME 4900. The remainder applies to BME 4910. A style guide is provided at the end this document. Use the sections headers as described in this document—not following this format will result in a lower grade.

Plan for your report to be at least 30 pages in length for BME 4900 and 40 pages for BME 4910. For equations, use Word’s equation editor. Use single line spacing throughout the report and make sure that pages are numbered.

BME 4900
Much of the BME 4900 final report is already written in previously submitted material (i.e., project statement, specifications, proposal, Alternative Designs 1-3, Optimal Design), but needs modification to fit with this report format. Note that every figure or table must have a title and a label number. Figures must be drawn with Visio or Autodesk Inventor. Points for each section given in (## Points).

BME 4910
The BME 4910 final report is an update of the BME 4900 report (i.e., the optimal design probably went through extensive modifications, the final design should be documented here).

Also required is a description of the prototype and its operation with photographs. Describe prototype testing with clients (or persons pretending to have the disabilities of the clients). This section should be at least 10 pages.

Points for each section given in [## Points].

Final Report

Page One:

Title of Project
By
Student Names
Team No.

Client #
Client Contact: Name(s), Organization, Address, Phone Number.
Abstract
This section summarizes the essential features of the project. Motivation for carrying out the project should be stated, as well as unique features of the project.

1 page maximum. (2 pts) [2 pts]

1 Introduction
This is an expansion of what was written in project statement. This is not a substitute for the report, and so do not echo the abstract. The introduction may open with the words, “This report...,” but there is usually a more attractive way to begin. Here is the place for context, relation to prior work, general objective, and approach. Don’t be cryptic. Remember that even your client/client coordinator or sponsor may have become fuzzy on the background, lost sight of your objective, and even disremember the key words. The introduction should tell reader what is in subsequent sections and outline the flow. Usual elements of the introduction are:

1.1 Background (client and disability)
1.2 Purpose of the project
1.3 Previous Work Done by Others
   1.3.1 Products
   Describe other products that are similar to this product from ABLEDATA, NSF Book Series, web searches, company catalogs ...
   1.3.2 Patent Search Results
1.4 Map for the rest of the report

The introduction should be 3 or more pages in length. (10 pts) [10 pts]

2 Project Design
This is a detailed description of the project and contains multiple subsections.

2.1 Introduction
This introduction should describe everything in the section. Use headers to partition the section as indicated.
The three alternative designs should be reported here, along with the reasons for selecting the optimal design based on specifications and realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

4 Pages Minimum. (6 pts) [6 pts]

2.2 Optimal Design

2.2.1 Objective
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.

1 Page Minimum. (2 pts) [2 pts]

2.2.2 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 PSpice, Matlab, and other software packages for verification. A complete analysis is expected for each subsection in the final report.

10 Page Minimum. (45 pts) [25 pts]

2.2 Prototype (BME 4910 Only)
This section provides a description of the prototype and its operation with photographs.
Describe prototype testing with clients (or persons pretending to have the disabilities of the clients).

This section should be at least 10 pages. [25 pts]

3 Realistic Constraints
Based on the optimal 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.

Two pages minimum. (5 pts) [5 pts]

4 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) [5 pts]

5 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 pts]

6 Life-Long Learning
Describe any new material learned and techniques acquired.

1 page minimum. (2 pts) [2 pts]

7 Budget and Timeline
   7.1 Budget
The cost of building the project should be detailed as completely as you can.
7.2 Timeline (Not Required for BME 4910)
Include a time-line using Microsoft Project planning software for building the project in BME4910 (be sure to allow time for prototype field testing). The timeline should be very detailed and provide many levels of activity for each subsystem. The man-hours to complete the project should also be stated. Do not list team meetings, lab time, or website work in your timeline.

A minimum of 50 tasks (items) is required.

(10 pts) [5pts]

8 Team Members Contributions to the Project
This section describes the contributions each team member made to the project.

   Team Member 1
   Specific details.

   Team Member 2
   Specific details.

   Team Member 3
   Specific details.

One Page Minimum. (2 pts) [2pts]

9 Conclusion
The conclusion should be a one to two paragraphs summary of the project. The conclusion should be a crisp review that wraps up what the reader should have read, and should confirm the impression that they have already drawn.

1 Page Minimum. (2 pts) [2pts]

10 References
For style, see STYLE NOTES.

1 Page Minimum. (2 pts) [2pts]

11 Acknowledgements
Include client/client coordinator or sponsor, outside sources, other departments on campus, and individuals that have helped. If this is an NSF Project to Aid the Disabled Project, then an acknowledgement about their funding should be stated, if this is a company sponsored project, then an acknowledgement about their funding should be stated.
12 Appendix

12.1 Updated Specifications
12.2 Purchase Requisitions and Price Quotes (Not required in BME 4910)
12.3 Anything that the reader may want to know but is not essential to the report. (Part specifications, datasheets, communication protocol commands, etc.)

(2 pts) [2pts]

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.
**Reference Style**

A numbered list of references may be provided at the end of the article as a separate page or pages of the manuscript. The list should be arranged in the order of citation in text, not in alphabetical order. You should list only one reference per reference number. Except for review articles, please try to limit the number of citations to 20 of the most recent 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. These will usually be deleted by staff editors if included. Please do not use a word processor’s automatic numbering feature. 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.