ECE 5745 Computer Architecture
Design Project Report Assessment Rubric

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This document describes the rubric for assessing design project reports. Note that unlike the lab assignments, the score for the design project report is solely based on the actual document without any criteria for code functionality. While obviously anything you discuss in your report should work, the actual code functionality is assessed as part of the project demonstrations during the last week of classes.

The project report should be written assuming the reader is familiar with the fundamental material covered in an undergraduate curriculum in computer engineering. Do not assume that the reader is familiar with the background related to your specific project. You must introduce sufficient background material so that a student which has attended the lectures for ECE 4750 and ECE 5745 can fully understand the project. However, if you are using a lab from ECE 4750/5745 as your baseline you probably want to summarize the design in some detail.

1. Report Format

The project reports can be as long as you like. Lab assignments usually require two weeks and the lab reports are around six pages including figures. The design project requires over five weeks so I would expect the project report be at least 15 pages. Please format your document with page numbers, single-spacing, 10-point font, 1" margins. Clearly mark each section with a *numbered* section header. All diagrams, tables, and figures should be numbered with a caption and be included in the main narrative of the text as opposed to placed at the end of the document. You must include the sections listed below. Please clearly number and label all sections; you are free to add numbered subsections as you would like.

- **Section 1. Introduction –** what is the main idea you are exploring? what is the motivation for this idea? why are we interested in pursuing this idea? dedicate a subsection or several paragraphs reviewing relevant papers in literature based on your literature search (see Section 2) with appropriate citations; include a brief description of what you did (what did you get working?), an overview of the results (which design did best?), and any high-level conclusions we can draw from your results. **Dedicate a subsection to acknowledging all help you received on your project!** This includes absolutely any help such as advice from a graduate student on using the tools, baseline designs from previous lab assignments or course projects, applications from other groups, etc.
- **Section 2. Baseline Design –** describe the baseline design you used as the starting point for your project; where did the baseline design come from? is it from a previous lab assignment or did you create it from scratch? include block diagrams, datapath diagrams, finite-state-machine diagrams, and/or pipeline diagrams as necessary – you should include a diagram from a previous assignment if it will help you explain your baseline design; make sure you explain why this baseline design is a reasonable starting point for comparison; including pipeline diagrams and potentially illustrative line traces is encouraged.

- **Section 3. Alternative Design –** describe in detail your alternative designs (you will likely have many alternative designs); you may want to describe your incremental design approach or how you used a highly parameterized design to create many design alternatives; include block diagrams, datapath diagrams, finite-state-machine diagrams, and/or pipeline diagrams as necessary; including pipeline diagrams and potentially illustrative line traces is encouraged; this will likely be one of the most detailed parts of the report. **Remember to provide a balanced discussion between what you implemented *and* why you chose that implementation.**

- **Section 4. Testing Strategy –** describe how you tested your modules (e.g., unit testing, directed tests, random tests, whitebox vs. blackbox testing); describe tests that you were able to leverage from previous labs, assignments, or projects; discuss the test cases you added in detail and explain why you added them; highlight any corner cases you specifically tried to test; include a table or some kind of visualization of important test cases; consider including annotated line traces to illustrate specific test cases; briefly discuss any critical bugs that you spent significant time working on and how you could have caught those bugs more quickly with better testing, assertions, or design. **Remember to provide a balanced discussion between how you tested your design *and* why you chose that testing strategy and test cases.**

- **Section 5. Evaluation –** report your simulation results using an appropriate mix of text, tables, and plots; do not simply include the raw data; you must include some kind of analysis of the results; why is one design better or worse than another? can you predict how the results might change for other designs or parameters? what can we learn from these results? this section will probably be one of the longer (and most important) sections; this is where you really get to demonstrate your deep understanding of not just what you built but how it functions and how it compares to the various design alternatives; your evaluation must include quantitative (and qualitative) analysis of performance, cycle time, area, and energy; consider including annotated line traces to illustrate specific trends (e.g., arithmetic unit or memory bandwidth utilization, stalling patterns, etc); **Remember to provide a balanced discussion between what the results are *and* what those results mean. You must include an amoeba plot!**

- **Annotated Bibliography –** cited references should be included at the end of the report in an appropriate format; your annotated bibliography must include at least three references to scholarly periodicals. You can includes as many additional references to both informal sources and scholarly periodicals, but again **you must include at least three references to scholarly periodicals.** For at least these three scholarly periodicals, you must include a brief (usually about 150 words) descriptive and evaluative paragraph (this is what makes it an annotated bibliography). Discuss how this reference provides background, motivation, and/or context for your project.

2. Literature Search

All projects should include a serious literature search which can include a mix of both informal and scholarly references. Your goal is to find references that will provide the necessary background, motivation, and context for your project. The Cornell library has a good introduction to research webpage (`https://www.library.cornell.edu/research/introduction`). You can use informal sources such as Wikipedia, other websites, textbooks, application notes, and/or course materials as starting points for your literature search, but you must also follow the citations in these infor-

mal sources to the "primary source" scholarly periodicals. Scholarly periodicals include academic journals and conference proceedings. IEEE Explore and the ACM Digital Portal are good resources for finding relevant scholarly periodicals. Once you find a relevant article, mining that article's related work section is an excellent way to develop your literature search. You might want to take a close look at the section titled "Distinguishing scholarly from non-scholarly periodicals" on the introduction to research webpage mentioned above.

Your literature search will help you prepare: (1) a discussion of this relevant literature in the introduction; and (2) an annotated bibliography. The Cornell library has a guide to annotated bibiliographies (`http://guides.library.cornell.edu/annotatedbibliography`). For each reference you should include the full citation (exact format is not that important) and a brief (usually about 150 words) "descriptive and evaluative paragraph". As the guide states, "The purpose of the annotation is to inform the reader of the relevance, accuracy, and quality of the sources cited." Discuss how this reference provides background, motivation, and/or context for your project. Your annotated bibliography must start with at least three references to scholarly periodicals. You can includes as many additional references to both informal sources and scholarly periodicals, but again **you must include at least three references to scholarly periodicals.**

3. Assessment Rubric

The rubric includes the following criteria most of which are weighted equally except for the lab report writing quality. Note the introduction is weighted more heavily than in a lab assignment because the literatue review is included in the introduction.

- ($\times$2) Introduction
- ($\times$2) Baseline Design
- ($\times$2) Alternative Design
- ($\times$2) Testing Strategy
- ($\times$2) Evaluation
- ($\times$1) Writing Quality

Each criteria is scored on a scale from 0 (nothing) to 4.25 (exceptional work). In general, a score of 3 is awarded for reasonable work while a score of 4 is reserved for very strong work.