ESE 498/499 Design Project Proposal Guidelines (based in part on material from Prof. Hiro Mukai and from Sandra Matteucci)

Formal Project Proposal: see guidelines for due date, presentations the following week

Submit a written proposal of your project, one proposal per group. The body of the proposal (the Introduction through Schedule/Timeline below) should be approximately 5 pages. Include these sections:

1. Title page (first page)
2. Abstract (second page)
3. Introduction
    a. Background information (why the proposed project is worth doing)
    b. Problem statement (background should lead to and justify the problem statement)
    c. Aims or objectives of the project (what you plan to do, be as specific as possible)
4. Proposed technical approaches / methods (how you plan to accomplish your objectives)
5. Feasibility study (with preliminary results)
6. Data to be collected and procedure for acquiring and/or equipment needed for the project
7. Anticipated results (what you expect to find in the project)
8. Deliverables
9. Schedule/Timeline for completion of the project
10. References

Detailed notes on specific sections are included below, roughly in order of how a proposal would typically be written.

1. Introduction

An introduction places your project in the context of previous work and discusses the implications of the work. Do not assume the reader has read the abstract. It is a separate and standalone summary of the project.

a. Background information (also a Purpose Statement, this section summarizes your motivation: why does your project matter?)
    - Briefly review pertinent literature and describe relevant prior work
    - Identify what is known and unknown and the significance of the problem
    - Lead to the problem or challenge, which may be broader than the scope of this project
b. Problem Statement
    - Specific problem(s) to be addressed in the project
    - Should relate to the project Title
    - Clarify, amplify, qualify
    - State specifications that need to be met by the design
c. Aims or objectives of the project
    - Be specific
    - State the primary objectives of your design; these may be related to, for example, building a physical prototype; developing a model for a system; analyzing the performance of a system, model, or algorithm
    - You may also list sub-objectives, specific but significant tasks to be accomplished in each objective

2. Proposed technical approaches / methods

- Again, be as specific as you can at this stage of the project
- Describe how you plan to accomplish your design objectives
- Include key equations critical to your objective, and define all variables
- If you have proposed to optimize a system, you should formulate the optimization problem clearly, with a well-defined objective function, decision variables, and constraints
- If a proposed approach does not perform as expected (doesn't meet the specifications), what alternative approaches can be used?
- Figures and tables
    - Include block diagrams, figures and tables where appropriate to describe your problem, objectives and technical approaches
    - Include numbers for all figures/tables
    - Label all axes in graphs
    - Include descriptive captions for each figure or table
    - Mention your tables and figures in the body of the text

3. Feasibility Study (preliminary results)

Include concrete results that demonstrate feasibility of the proposed project. Aim to address some portion of the project, or complete a simplified version of the overall project, to show feasibility of the approach as well as your ability to accomplish the project. Results might include parts, measurements, software solutions, data, etc.

4. Data to be collected and procedure for acquiring and/or equipment needed for the project

This section could be a subsection of the methods. As in other sections, be as specific as possible. What data do you need to complete the project? How will it be acquired? If one avenue for data collection turns out to be more difficult than expected, what alternative plans do you have?

What equipment, if any, will be needed for the project?

5. Anticipated results

In the proposal, this section serves the role that the Discussion serves in the final report. As much as possible, identify the expected results, including any uncertainties. Typically, the results of your work will have implication beyond a single quantitative assessment, e.g., a useful scheduling problem should do more than simply find a feasible schedule. Try to convey the complexity of your problem and subtlety of the expected results. Identify expected tradeoffs in the performance.

6. Deliverables

State explicitly what you promise to deliver. The deliverables will include a well written final report and a webpage and should also include tangible product(s) such as working computer programs and/or an engineering prototype.

7. **Schedule/timeline for completion of the project**

   As in the one-page proposal, include a Gantt chart or equivalent describing the anticipated timeline for all tasks required to complete the project. At this stage, you should have a much clearer idea of the specific tasks required.

   Include in this section a description of specific responsibilities for individual group members. Include a description of the backgrounds of group members (experience, courses, etc.) that qualifies you to complete the proposed project.

8. **References**

   While not explicitly required for the project, nearly all projects should have references. Use IEEE or a similar style (link) with appropriate citations in the body of the text.

9. **Title page – include the following:**
   a. "ESE 499 Capstone Design Project Proposal"
   b. "Submitted to Professors Trobaugh and Schaettler and the Department of Electrical and Systems Engineering"
   c. Group members - Name, department(s), candidate degree(s), and email address
   d. Name, title, affiliation, and email address of the project advisor or any outside resources
   e. Date of submission
   f. Brief descriptive title of the project (see notes below)
   g. Time period over which the project is to be conducted

   Some notes on the Title (working title at this point)

   - Creates a first impression
   - Influences a reader to continue reading
   - Conveys topic appropriately and fully
   - Be specific
   - Avoid unnecessary words, "A study of…"
   - Keep it short: 10-12 words
   - Revisit the title after writing your proposal when your ideas are fully formed

10. **Abstract – A brief abstract (100-200 words) of the proposal, preceded by the title and the names of the group members and the project advisor**

    An abstract provides a stand-alone summary of your project; a reader should be able to get an idea of your project from the abstract alone. Try to be as specific as possible within the word constraint, while only including significant details. The proposal abstract should

    - Introduce the problem to be solved or addressed
    - Describe what you plan to do to design a solution to part or all of the problem
    - Describe how you plan to accomplish your objectives, any technical methods you plan to use
    - State the results you expect to find

Oral presentation Oral presentations for the proposal will be 10-15 minutes per group with 5 minutes for discussion. Formatting is up to you, but your presentation should be logically organized, well-rehearsed, and professional. Presentations will be scheduled in sessions, and you will be expected to attend the entire session at which you present. You will also be expected to review the other presentations in your session. Near final slides should be submitted on Blackboard by 6pm the night before the presentation.