Project Proposal Guidelines
ME481 Spring 2020

Objectives

- Demonstrate an understanding of the technical design problem, articulated in your own words. Provide an understanding of the “physics” of your problem.
- Describe the overall context of your project. Address factors such as economic (e.g. business case like overall market size/value, key competitors, and current trends), environmental (e.g. sustainability), social and cultural, global, ethical, and safety.
- Summarize relevant technical literature and benchmark/analogous products and/or research (use proper referencing techniques).
- Define your stakeholder and articulate and rank stakeholder objectives.
- Translate stakeholder objectives into appropriate project objectives and requirements.
- Propose a viable concept of operations and system architecture.
- Provide an initial Work Breakdown Structure (WBS) and project timeline with appropriate milestones.
- Create a proposed budget with justification. Include a fundraising strategy.
- Articulate key challenges and/or risks and setbacks you may encounter.
- Introduce yourselves as individuals and demonstrate your plan to function as a well-organized team.

Written Proposal

Throughout the report, do not just make assertions—rather, back up the assertions with evidence. Use first order mathematical and physics estimates as well as references from journal articles, books, or other sources that are well respected.

Title Page¹ [1 page maximum]
- First line: “ME 481 2020 Spring – Project Proposal Report”
- Second line: Your own descriptive title/team name
- Logo (project, team, or sponsor)
- Names of all team members and their team role titles
- Final line: “Instructor: A Zachary Trimble”

Executive Summary [1 page maximum]

The Executive Summary should give the reader all the important information and findings of the document without having to read any further. Summarize both the project and the contents of the report. In other words, you must capture the reader’s interest; summarize the purpose, importance and impact of the project; and inform the reader what they can expect to learn about the project from this particular report. Because of its content and location this section is the most widely read section of the document. For that reason, the section should be well written and carefully proofread. First impressions matter. Incorporate into the executive summary the project mission

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¹ Should be paginated with “i, ii, iii, iv,…"
statement in *italics*. The mission statement should be a smooth part of your executive summary and not an after-thought or add on.

**Table of Contents**
- List of Figures and Tables¹ (should show page numbers)
- Acronyms and Abbreviations¹
- Technical Report Body² [10 pages maximum]

Address the report objectives. Below is a suggested outline, but you have freedom to address the objectives in whatever way is best for your project.

1. **Introduction**
   Start out by describing the magnitude of your problem, generally by defining a "striking" statistic: number of people affected, severity of the problem for those affected, or size of the market your product will try to enter, but don't be "fluffy". In your own words, provide an explanation for why there is a need to expend the effort required to execute a project such as yours in order to solve this problem. Make effective use of graphics, charts, etc.

1.1. **Technical Context**
   Describe the scientific and technological background to your problem (e.g., are you primarily dealing with challenging fluid mechanics, heat transfer, mechanisms, etc.) Explain some of the physical phenomena at play in your design space that a "typical" engineering student may not have been previously aware of (e.g., transient viscous flow, convective heat transfer, etc.) for which you had to conduct your own in-depth research into the literature. This is where you also define some of the unique terms and jargon of the field encompassing your project.

1.2. **Business Context**
   Aside from a technological challenge, any successful solution must also be able to be sold as part of a viable business in order to be successful. Describe the business ecosystem your sponsor (if applicable) and project will have to operate within. Include information on:
   - The intellectual property space you may work with; are there many existing patents that constrict your own design freedom? If so, describe how they work and where you may be able to add your own novel solution into the mix. Also describe who will end up with ownership of any intellectual property you will be generating as part of this project.
   - The key competitors and their approximate market share, with the most recent statistics you can find. Will you have to try and sell a product in a space with little competition, or will you have to exist alongside some very well-established organizations?

² Should be paginated with “1, 2, 3, ...
2. **Design Problem Definition**
   Make sure to make effective use of graphics (e.g., concept of operation, system architecture).

2.1. **Overall Goal**
   In a single sentence, or a few sentences, define the overall goal for your project. Don’t forget to include mention that your solution will be executable within the constraints of the time/funds/resources of your team and the class.

2.2. **Primary Stakeholder Objectives**
   Describe the highest priority (i.e., top 3-5) objectives described by your stakeholders, and provide a rationale for their importance. What must your solution absolutely be able to accomplish to be considered successful?

2.3. **Primary Requirements**
   For the same highest-priority objectives you described above, describe the associated project/functional requirement(s) you and your teammates created. Explain how your requirement(s) prove you’ve met each objective, and give details of how each will be measured in a validation experiment.

3. **Project Management/Proposed Approach**
   What are your time and money constraints/needs and what are the general tasks and risks. What are the key milestones that must be reached for your project (i.e. not just class milestones)?

3.1. **Work Breakdown Structure (WBS)**
   Create a visual WBS and then explain the rationale behind your organization. Be sure to include both management tasks as well as technical ones.

3.2. **Project Timeline**
   Create a clear graphical milestone timeline and describe what it means to achieve each milestone.

3.3. **Budget**
   Based upon your preliminary research into existing parts/materials you may use, produce an estimated top down budget. Focus on high-level items and a brief rationale for each (e.g., building materials, purchased items, printed media for fundraising, travel). You may need to coordinate with your sponsor beforehand to refine these numbers. Outline your initial funding plans for applying for support (e.g., grant applications, business plan competitions, Kickstarter postings, etc.). You will apply for, through me, up to a maximum of $2,000 from the ME department.

3.4. **Potential Challenges/Risks**
   You are all but guaranteed to encounter unexpected events (both positive and negative) that will require a deviation from your initial project plan. In this section, describe what you think could be your top three to five most likely negative events that may warrant a revision to your design and/or timeline. Suggest at least one possible means to deal with each event. Show that you have reasonable backup plans that will keep your project on track.

4. **Conclusion**

5. **References** (Does not count against page limit)

**Appendices** (Does not count against page limit)
1. **List of Requirements**  
   Provide the full list of your requirements in table format

2. **Team Structure**  
   Describe your core team roles, as well as who may be tasked with leading the design of each subsystem or responsible for each technological “field” (e.g., structural design, electronics, FEA, manufacturing). Three of the roles must be Project Manager or Chief Executive Officer (CEO) primarily responsible for the time budget, Chief Engineer or Chief Technology Officer (CTO) primarily responsible for the performance budget, and Financial Manager or Chief Financial Officer (CFO) primarily responsible for the money budget. Provide an organizational chart.

3. **Gantt Chart**  
   Full and detailed Gantt chart (in whatever format you may choose that is readable) that directly maps your WBS and milestones onto a proposed timeline for both this semester and the next.

4. **Literature Survey**  
   This section includes a complete annotated bibliography literature review including all articles which are of particular relevance but were not directly referenced in the text. Unlike traditional references in the text, where URLs and Wikipedia are justifiably frowned upon, this contains all references. This is a resource for the team and should be continually updated and in front of the team throughout the project. The Literature Survey should cover a thorough list of available products, patents, make and models, and relevant developmental research, etc. prior to the Preliminary Design Report. The format should generally follow:
   - Search terms or category
     - Full Reference
     - [Initials of contributor]
     - Short discussion of how and or what this reference contributes to the project (i.e. customized, not a regurgitation of the abstract).

5. **Team Policies and Expectations**
   All team members will sign the hardcopy of this document. At a minimum your team contact must include:

   5.1. **Team decision-making process**  
      Describe how your team will make decisions. There will be disagreement throughout the project, so agree now how you will make a controversial decision. As a team you are agreeing to this process and thus if the decision is made “in process” you are agreeing to fully support the decision once it is made – to have full buy-in – even if you didn’t initially agree. Some example decision paradigms include the “czar” method (one person makes the final decision), democratic methods, unanimous decision, etc. You may utilize or combine different methods for different decision types (e.g. fiscal, technical, or administrative decision types), as long as your method is explicit and all-encompassing in scope.

   5.2. **Team meeting policy**  
      Your team meeting policy should specify three things: (1) recurring full meeting times and location (and recurring sub-team meeting times and locations if applicable), (2) policies for scheduling team meetings (who has the power to
schedule meetings, and how long in advance should notice be given), (3) reaffirm your commitment to follow the SPACER meeting protocol, and (4) required individual preparation for meetings (what should be sent out beforehand, and what should be brought to meetings) – commit to PREP in appropriate situations.

5.3. **Expected contribution of work**

This section should describe the general expected weekly contribution of work from each team member. This is typically in the form of work hours, but other “units” of work can be used (remember we expect progress not just hours spent). This should include a breakdown of expected contributions to meetings, technical, administrative, and financial workloads. As your capstone experience this is at a minimum 10-12 hours of progress per week.

5.4. **Tolerance policy for non-cooperative members**

This policy should specify how the team responds to non-cooperative team members. This should include steps on communicating, and working with problem team members. Teams have the ability, under the direction of the section instructor, to fire destructive members from their teams if necessary; however, to take this step a clearly defined hierarchal resolution process should be developed that includes intervention of the TA and then course instructor at an appropriate time leading up to this step, and must be considered as a last resort after everything else has failed.

**Formatting Information**

- Use “Century Gothic” single-spaced 12-point font for all body text. Headings may be larger if desired.
- Use 0.5 in. margins on all pages.
- Number all pages after the Table of Contents in the lower right footer of each page. Use roman numerals for the pre-content.
- Figures and tables must be centered in the middle of the page (i.e., no text-wrapping) and have a unique number and caption.

**Evaluation**

All items are graded on a 10-point scale (see the RIP Website).

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<thead>
<tr>
<th>Objective/Element</th>
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<tbody>
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<td>Mission Statement</td>
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<td>Problem Description</td>
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<td>Literature Review</td>
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<td>Team Contract</td>
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<tr>
<td>Quality, Conciseness, Effectiveness</td>
<td>0.1</td>
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</tbody>
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Oral Presentation

**Audience:** Your stakeholders and the ME 481 course

**Format:** Formal (if possible questions will be held to the end)

**Location:** Holmes Hall 309

**Date:** 18 & 20 February

**Time:** 30 minutes (encompassing both presentation and questions/feedback)

**Participation:** All team members must present

**Attendance:** All students must attend all presentations. You are expected to be an active peer reviewer and ask meaningful questions and provide meaningful feedback.

**Dress Code:** Business professional (Hawaiian)

**Evaluation:** Based on the presentation evaluation criteria posted to the course website.

- **If Your Project Has Sponsor(s):** You must also invite your sponsor(s) to your oral presentation and make every effort to schedule your presentation so that they can attend. If your sponsor(s) are unable to attend, it is your responsibility to arrange for a teleconference or video recording of the full 30 minute period.

- All slides (except Title Slide) must show the slide number and the total number of slides in the main presentation (not including Backup Slides) e.g. 14/37

- The name of the presenter should be on the first slide of a contiguous set of slides that the student is presenting. The student’s initials should be on each other section.

- The presentation should cover all the information in the technical report.

Submission Information

- **Deliverables: Due at 1500 on Friday, 21 February**
  - Hard copy of your report “bound” with something more than a staple
  - Digital copy of your report
    - File naming convention: “me481_2020s_proposalReport_[abbreviated team name].doc”
  - Digital copy of your slides
    - File naming convention: “me481_2020s_proposalPresentation_[abbreviated team name].ppt”

- **Submission:**
  - Hard copy of your report put in collection box in ME office (Holmes Hall 302)
  - Both electronic deliverables must be submitted as attachments to a single email written by the project manager, addressed to the instructor, and having the subject line “[ME481 2020s] - [Team name] - Project Proposal Deliverables”
  - The report must be in **Word** format (.doc or .docx) format, and the oral presentation slides must be in **PowerPoint** (.ppt or .pptx) format.
  - **If Your Project Has Sponsor(s):** A second email written by the project manager, addressed to the sponsor(s) and cc’d to the instructor, and having the subject line “UH Senior Design Project - Proposal Documents” must be sent with the deliverables attached. All deliverables sent to sponsor(s) must be in Adobe PDF (.pdf) format.
Grading
As stated in the syllabus, the Project Proposal constitutes 15% of the total course grade for ME481: the oral presentation constitutes 5% of your total course grade, while the written report and executive summary together constitute 10%. Each part of the Project Proposal will be graded individually as described below:

- The executive summary will be graded on a **10 point scale**, factoring in such elements as thoroughness, conciseness, and style.
- The technical report will be graded on a **100 point scale**, broken down as follows (see report section descriptions below):
  - **Introduction** 30 points
  - **Design Problem Definition** 30 points
  - **Proposed Solution** 15 points
  - **Proposed Approach** 15 points
  - **Style & Formatting** 10 points
- The oral presentation and associated slides will also be graded on a **100 point scale**, broken down as follows:
  - **Introduction** 25 points
  - **Design Problem Definition** 25 points
  - **Proposed Solution** 15 points
  - **Proposed Approach** 15 points
  - **Slide Style & Formatting** 10 points
  - **Presentation Delivery** 10 points