The Senior Design Proposals must explicitly follow the outline below.

Additional material may be added to appropriate sections, but all of the sections below, and the content indicated in each section, must be presented in the order given.

Title page

Name of the project

Date – Semester and year

Group number

Names of all groups member, major and report section responsibility

Names of instructor(s), course

Table of contents

At a minimum must contain the headings – that is, everything in **bold** - of this outline as distinct sections of the report, with appropriate heading levels. Note - the title page and table of contents never appear in the table of contents.

1. **Introduction**
   1. Description of the project
   2. Brief description of the proposed design solution, with illustrations
2. **Research** 
   1. Describe your research into similar devices or technology, and the professional and/or safety standards that govern their use. What ideas have you borrowed from others in developing your proposed solution? Do any of these ideas have documented or potential safety or environmental issues?
3. **Design specifications**
   1. Detailed specifications for the design. Include overall specifications for the design as well as for each subsystem and component. These are the specifications that you are seeking to meet with your design solution, and should refer to the project description, the research you have done, and applicable professional and/or safety standards. In particular, pay close attention to multidisciplinary specifications, that is, specifications that involve more than one field. For example, the torque and speed of a motor required in order for a particular motion to take place (mechanical) determine the power requirements to drive that motor (electrical) and the control requirements to make sure it all happens properly (computer). The more complete and realistic this list of specifications, the easier time you will have setting milestones, schedules and completing the project on time.
4. **Design overview**
   1. A brief, non-technical overview of the proposed design solution, complete with illustrations and descriptions of the function of the overall system and each subsystem.
5. **Mechanical Subsystem**
   1. A description of the proposed mechanical subsystem, including but not limited to initial sketches and concepts, theory and hand calculations, initial CAD models of parts and assemblies. Include an estimated bill of materials and costs for each mechanical component. Discuss any challenges or hurdles anticipated with integration of the mechanical subsystem to the rest of the design solution. Discuss alternative approaches if the proposed solution presents too many difficulties.
6. **Electrical/Electronic Subsystem**
   1. A detailed description of the electrical and/or electronic subsystem, including but not limited to initial concepts, theory and hand calculations, initial diagrams of circuits. Include an estimated bill of materials and costs for each electrical component. Discuss any challenges or hurdles anticipated with integration of the electrical subsystem to the rest of the design solution. Discuss alternative approaches if the proposed solution presents too many difficulties.
7. **Computer/Software Subsystem**
   1. A detailed description of the computer and/or software subsystem, including but not limited to initial concepts and theory employed, initial state machine diagrams, flow charts and block diagrams that describe the function of the proposed computer code. Discuss how well the proposed solution addresses the design specifications. Include an estimated bill of materials and costs for the computer subsystem. Discuss any challenges or hurdles anticipated with integration of the computer subsystem to the rest of the design solution. Discuss alternative approaches if the proposed solution presents too many difficulties.
8. **Discussion**
   1. Technical discussion of the proposed design, focusing on how the proposed solution works and how well it addresses all of the design specifications in Section 4. Discuss overall challenges or hurdles anticipated with the schedule or the physical integration of the various subsystems. Discuss alternative approaches that you will try if the proposed solution presents too many difficulties. An overall bill of materials and costs for the project are to be included.
9. **Schedule/Timeline**
   1. A realistic, detailed, week-by-week schedule for the remainder of the semester, in Gantt format (see link from the syllabus to an Excel template). This schedule must show explicitly how the mechanical, electrical and computer subsystems are developed, simulated, manufactured, and tested in parallel, then come together for integration into a complete system. There must be at least two weeks between the scheduled final system integration and the date of the final competition or exposition.
10. **References**
    1. Must be in proper ASME or IEEE format – list here the sources of everything that you have used in the process of developing your design solution that was not original to you. **Everything that is not yours – ideas, equations, concepts, photos, graphic, everything – must be documented and properly referenced.** This is major evidence of the ethical and professional manner in which you carried out your design proposal. All references must be properly cited in the text, and care must be taken to ensure that all information comes from reliable and trustworthy sources.