# GUIDANCE ON CAPSTONE PROJECTS

1. **Capstone projects should follow**

- Design, Analyze, Build, Test and Recommend

OR

- Design, Analyze, verify/validate, Re-Design, Recommend

- An iterative engineering design process. Capstone projects should apply best practices for product design process, including understanding customer needs, defining product requirements, generating and selecting among concepts, detailed engineering design, costing and prototyping. Projects should apply these methods to real-world products or systems.

2. **Capstone projects should be** challenging, innovative, and unique.

- Projects should challenge the creative, intellectual and technical abilities of the students.
- Student's success rate is high in areas where new technologies open opportunities for novel solutions. Students do not have the highly specialized knowledge to compete effectively with seasoned experts in a narrow area.
- Creativity is an important engineering skill, so projects should be amenable to multiple solutions. Sponsors should avoid imposing a particular solution on the students, but can guide students in appropriate directions by providing all relevant information about the problem.
- Students should use ***analysis-driven design*** methodology and avoid trial and error. The best projects use analytical skills to model the problem and potential solutions to make the design an analysis driven process.

**To successfully complete the project proposal, students are expected to**:

**a.** Define an appropriate and manageable project that can be designed and built in a 15-week semester*.

*Possibility for multi-year projects – provided the project can be modularized to 15-week sub-projects.

**b.** State user or customer needs, identify project constraints and refer to appropriate standards.

**c.** Develop the requirements and design specifications.

**d.** Search for background history and current research literature on the topic. Look for current technologies, and lifecycle of similar products.

**e.** Evaluate various design options (design tradeoffs) and select the best option to satisfy design specifications.

**f.** Complete a detailed design (decomposition).

- Use of analytical calculations or simulations to verify design is required.
- If possible follow simulation driven product development.

**g.** Plan project implementation: schedule, work breakdown, progress tracking and budget.

Note: If the capstone project involves assembling sub-systems, at least one sub-system should be designed and built from scratch.

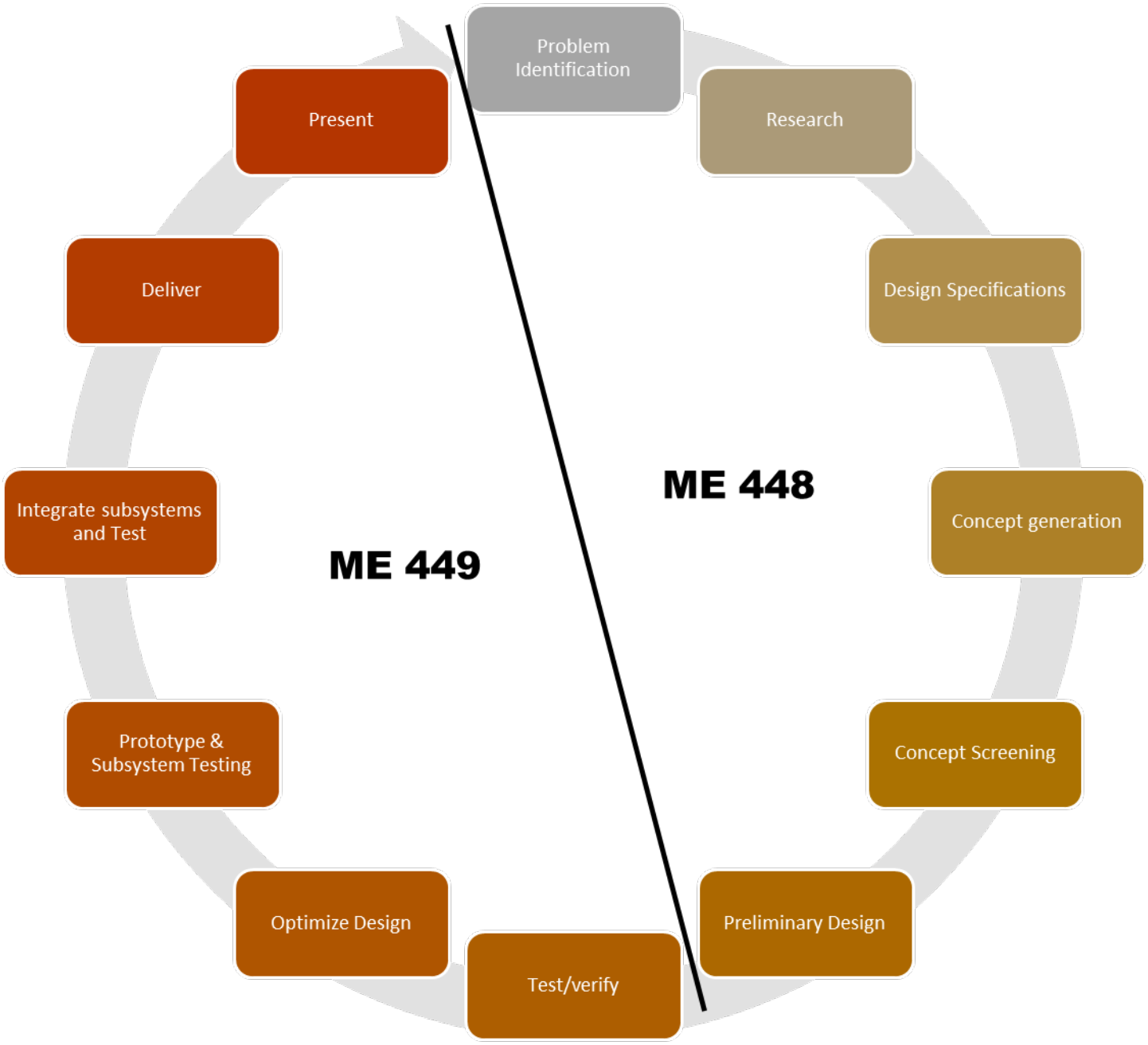


**Figure 1: Schematic showing important steps in the capstone sequence.**