1. ES401 Engineering Design Methods

2. 3 credit hours, 2 recitation hours, 2 unscheduled laboratory hours

3. Course coordinator: CDR Tracie Severson, USN

4. No required textbook

   a. Supplemental Text: Dym & Little, Engineering Design / A Project-Based Introduction, Wiley, 4th Edition

5. Specific course information

   a. This course is an introduction to the engineering design process and project management. It also includes the composition of the proposal for the senior design project.

   b. Prerequisite: ES309

   c. Required course

6. Specific goals for the course

   a. At the conclusion of the course, students will be able to:

      - Understand and demonstrate the principal steps and activities associated with the engineering design process.
      - Practice key professional skills associated with engineering design (decision making, project management, communication, and collaboration).
      - Develop and present a Preliminary Design Review.
      - Develop a plan for detailed design work across two semesters, in collaboration with the project advisor and the instructor
      - Demonstrate effective execution of a component of the design plan at the end of the fall semester during the formal Phase I Design Demo

   b. This course introduces the following Student Outcomes:

      - (a) an ability to apply knowledge of mathematics, science, and engineering
      - (b) an ability to design and conduct experiments, as well as to analyze and interpret data
      - (e) an ability to identify, formulate, and solve engineering problems

- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Outcomes (f), (h), and (j) are assessed in this course

7. Topics covered:

- Conceptual Design
  - Problem definition
  - Objectives and Functions
  - Design Alternatives and Decision Matrices
- Preliminary Design
  - Functional Block Diagrams
  - Work Breakdown Structures and Gantt Charts
  - Cost Estimation
  - Risk Management
  - Test Planning
- Detailed Design
  - Specifications and Standards
- Engineering Ethics