Senior Design I

- **EECE 401**
  - CRN 86517
  - 3 credit hours
  - W 1:10 – 4 pm
  - LKD1002 →3121
- **Instructor**
  - Dr. Charles Kim
  - (202)806-4821
  - ckim@howard.edu
  - Office Hours
    - M 1:30 – 3:00pm
    - TR 3:00 – 4:30pm
    - F 1:30 – 3:00pm (Scheduled appointment only)
- **TA**
  - TBD
- **Web ---Syllabus, Notes, etc**

Senior Design

- Is
  - Culmination of EE/CpE Education, Training, etc
  - **Design *experiences*** that require adequate consideration of
    - **Knowledge**
    - **standards, and**
    - **constraints**
    - related to the **electrical/computer engineering discipline**.
  - ***Process*** to final product (through Senior Design II)
- Is NOT
  - Further expansion of a class project
  - Final product only

Course Objectives Topics

- Objectives
  - Learn and use design process to meet needs
  - Becoming to be aware of Technology Impact to Society
  - Becoming an effective team member
  - Becoming an effective communicator
  - Enjoy Design Experiences
- Topics of the course
  - Engineering Design Processes
  - Teamwork
  - Communication
  - Professional Skills

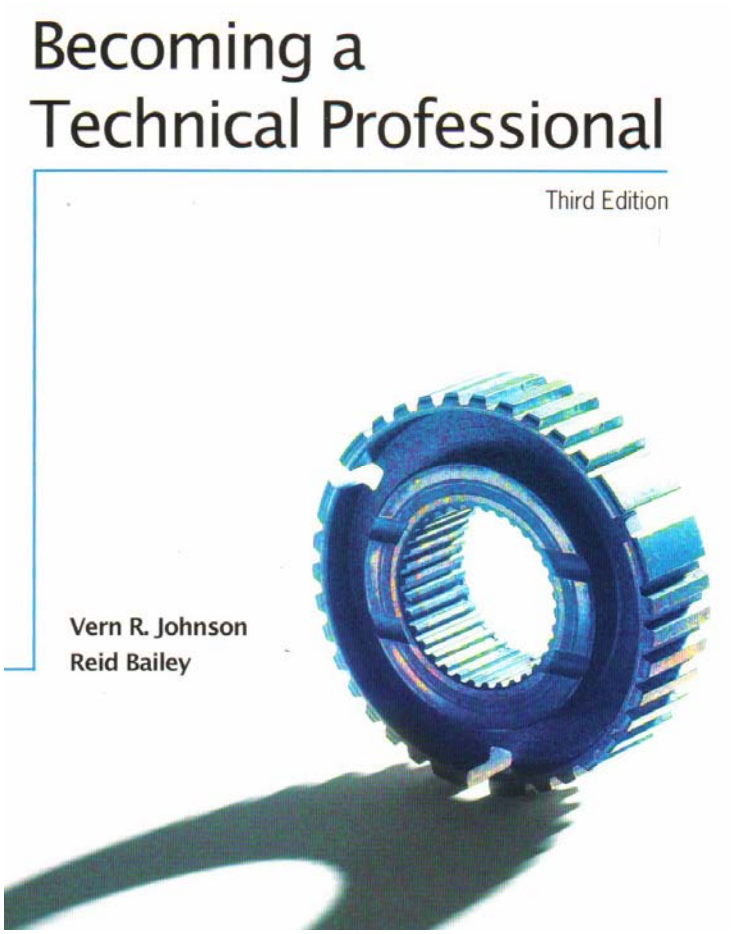
“Design” – ABET definition

- ABET
  - “The **process** of devising a system, component, or process to meet desired needs.”
  - “A **decision-making** process (often iterative), in which the basic sciences, mathematics and engineering are applied to convert resources optimally to meet the stated needs.”
  - **“The experiences** that require adequate consideration of **knowledge, standards, and constraints** related to the **electrical/computer engineering discipline**.”

“Design” – Industry definition

- Industry
  - (1)“Determine that a need exists with a customer for specific goods or services and how much that customer is able and willing to pay for it. (2)Then determine if the product or service is compatible with the competencies of the company and if it can be manufactured at a cost that is less than the customer will pay. (3)If so, proceed by designing to match the company’s ability to manufacture, rather than basing the design on state-of-the-art technologies. (4)Finally, prior to full implementation prepare a pilot demonstration”

Main Text and Resource



- Becoming a Technical Professional
  - by Vern Johnson and Reid Bailey
  - published by Kendal/Hunt Publishing Co.
  - 3rd Edition
  - ISBN 13:978-0-7575-2765-4
  - Written for first-year engineering students
  - Process/Idea is same for seniors with actual application/implementation of the process/idea.
  - I love this book. Over the summer, amid busy schedule, I read them all.

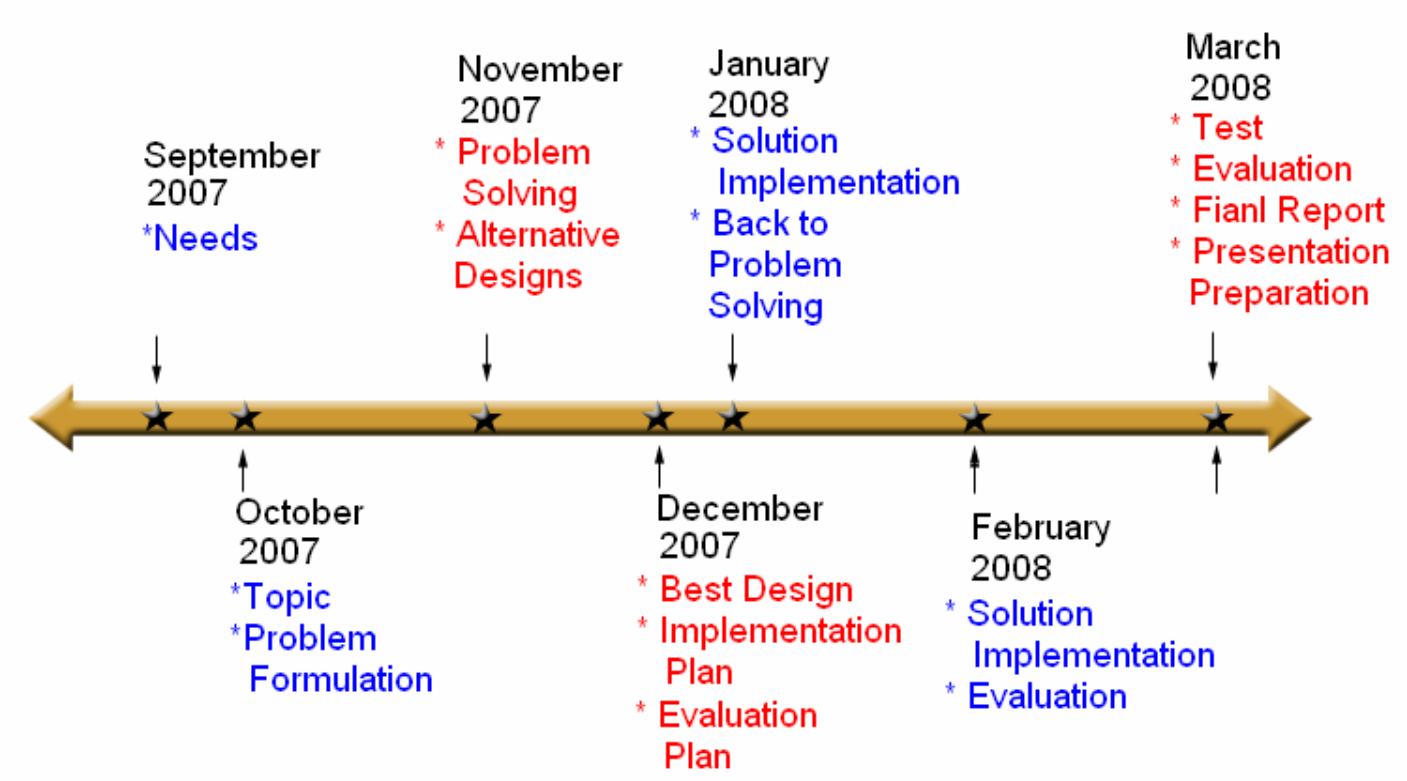
Course Grading and Expectation

- Expectation
  - Attendance
  - Active Participation
  - Weekly Activities
  - Assignments
  - Actively seeking solutions
  - Active interaction with instructor and advisor
  - Everything counts
  - Professional manner

- Grading
  - Individual Scores
    - Attendance (10%): only on-time arrival counts
    - Participation in public speech or professional communication (Extra 5%)
  - **Group Scores**
    - Weekly Class Activities (30%)
    - Assignments (30%): Needs, Current Art, and Solutions.
    - Process of Project (30%): Submission and Presentation
    - Peer Evaluation Rate Applied to the group score distribution to each team member

Milestone

- Understanding Design Processes: September
- **Project Topic Selection**: September
- Team Formation: September
- **Problem Formulation:** October
- **Problem Solving and Top Design Selection:** November
- **Design Implementation: Next Semester**



Engineering Design – Topics and Objectives

- Topics
  - Engineering Design Overview
  - Problem Formulation
  - Problem Solving
  - Solution Implementation
  - The Art and Science of Creativity
  - Project Management
- Objectives
  - Understanding an engineering design process
  - Understanding the 3 phases of design and how design is an adaptive, systematic process
  - Applying a design process to meet a set of needs
  - Design it!

Engineering Design-Overview

- **Problem Formulation**
  - Recognition of a set of **needs**
  - **Information** gathering about the needs
  - Determine the **requirements** of the project
- **Problem Solving**
  - Investigates the available **alternatives** to meet the requirements – **Current State of the Art**
  - **Generates and Analyzes and Specifies** alternatives with the requirements
  - **Makes Decision** on which alternatives will be implemented
  - **Selects** the Top Design
- **Solution Implementation**
  - Creates an implementation and test **plan**
  - Follows the plan to **build** the design
  - **Evaluates** against the requirements from problem formulation

Characteristics of Design

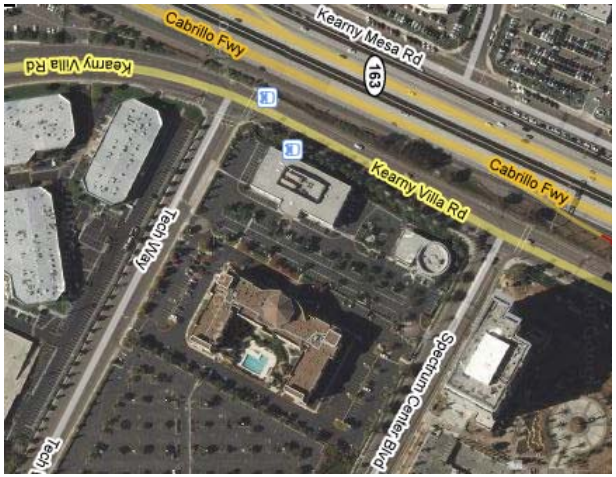
- Process cycles through the 3 phases under constraints, regulations, rules, etc
  - Problem Formulation
  - Problem Solving
  - Solution Implementation
- Design is systematic, not trial-and-error
- Design is adaptive, not a recipe
- Design is a process, not an event or product

Design is a Systematic/Adaptive Process

- Iteration back to earlier phases
- Refinements of the requirements
- Reconsideration of earlier activities
- Multiple phases simultaneously
- Engineering and Scientific Knowledge
- Rigorous Testing
- Execution of Planned Activities
- Regulation. Codes, Rules, Standards, etc

The cost of “Assumptions” and No-Compliance

- Difference between two photos of the same building is about $20M.



Class Activity

- Wireless Guitar Amplification System
- Focus on **Problem Formulation**
  - **The needs (by today)**
  - **Requirements** (**by today)**
  - **The Current State of Art (by next week)**