# Designing a Lab Project to Fit Educational Objectives

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## Purpose:

*Note*: While this is not technically an experiment, this article shows philosophy behind the design of a project, and what the students and educators should expect out of the project.

## Engineering Design:

According to ABET, engineering design is the process of devising a system, component or process to meet desired needs. It is a decision making process in which the basic sciences, mathematics and engineering sciences are applied to optimally convert resources to meet a stated objective.

The fundamental elements of a design process are:

- the establishment of objectives
- synthesis
- analysis
- fabrication
- testing

The engineering design component of a curriculum must include at least some of the following features:

- development of creativity among students
- use of open-ended problems
- development and use of design methodology
- formulation of design problem statements and specifications
- consideration of alternative solutions
- feasibility considerations
- detailed systems descriptions

It is also essential to include a variety of realistic constraints such as:

- economics factors
- safety
- reliability
- aesthetics
- ethics
- social impact

This three-hour course has a 1.0 hour engineering design component. The primary intent of this course requirement is for the student to learn the criteria and procedures involved in a design project. A secondary purpose is to develop a topic covered in class to greater depth utilizing the concepts of engineering design. The following tasks are required for the successful completion of a project:

| | |
|---|---|
| Task 1. Obtain an analytical model of the system | 10% of the grade |
| Task 2. Obtain a simulation model of the system | 10% of the grade |
| Task 3. Construct the prototype | 40% of the grade |
| Task 4. Experimental verification of physical system parameters | 10% of the grade |
| Task 5. Demonstrate the project (create date) | 10% of the grade |
| Task 6. Submit a written report (create date) | 20% of the grade |

The project report will contain:

- Cover sheet with the title and the name of the student
- Abstract
- Design equations
- Computer listings
- Experimental results
- Conclusion