

Introduction

September 25, 2010

Scientific and Engineering Projects Class

What You Will Learn

- What Scientific and Engineering Projects Are
- What the Goals Are
- How to Conduct Research
- What is a Good Outcome and How Best to Achieve It
- Tips and Techniques

Examples of Projects

- Building a skyscraper
- Designing a new smartphone
- Finding a more effective lung cancer treatment



More Project Examples



Electric car from 1913

- Designing a car that meets new fuel efficiency requirements
- Determining the relative effectiveness of a new weight loss program

Types of Projects (of interest here)

SCIENTIFIC

- Discover new principles, properties, relationships
- Conduct Experiments
- Collect Data
- Reach conclusions
- Employs the Scientific Method

ENGINEERING

- Create a product or service
- Requirements
- Testing
- Iterative process
- Employs the Engineering Method*

* Our terminology

Note: Many projects may be a combination of these

Important General Principles

- Follow an appropriate process (Scientific Method, Engineering Method)
- Keep extensive and accurate documentation (Notes, experimental data, test results, etc.)
- Address important questions:
 - What was accomplished?
 - Why is it significant?
 - What are the next steps?

Project Stages

- Choose a Project
- Background Research
- “The Meat” of the Project
- Documentation
- Presentation

The Meat of the Project

SCIENTIFIC

- Propose a Hypothesis
- Design an Experiment
- Conduct Experiment
- Analyze Data
- Accept/Reject Hypothesis

ENGINEERING

- Determine Requirements
- Create Preliminary Design
- Build Product/Service
- Test Product/Service Against Requirements
- Refine Design
- Test Redesigned Product/Service
- Repeat design/test cycle until requirements are met

Tips

- Start Early
- Begin writing your final report now
 - Well, not now, but as you're doing your background research
- Keep a project notebook
- Talk with others about your project and your ideas
- Start Early

One Final Point

- Start Early



Citations

- Craven, Jackie, "The New World Trade Center: South Elevation of Freedom Tower", About.com: Architecture <http://architecture.about.com/od/worldtradecenter/ig/World-Trade-Center-Plans/Freedom-Tower-Model-South.htm> (Freedom Tower Picture)
- Miller, G.E., "Who Keeps Killing the Electric Car?", 20 Something Finance, May 29, 2008, <http://20somethingfinance.com/who-keeps-killing-the-electric-car/> (Electric Car Picture)
- Craig, Barbara, "Just Barbara's Blog", February 7, 2007, <http://justbarbara.wordpress.com/2010/02/07/> (Wake-up Picture)