

# The Way Things Work

## 1 Introduction

This seminar will take an in depth look at dozens of different inventions, mostly from the The Way Things Work books (see below). To supplement the information in those books we will be looking into the history and modern uses of many of the inventions we look at, as well as building a model of an invention or a piece of an invention each week.

The purpose will not be to do experiments that show physical principles; rather it will be to learn how human creativity can and has been used to use physical principles to various ends to satisfy various needs.

## 2 The Way Things Work Books

The recent editions of this book are filled with humorous explanations that use miniature angels and woolly mammoths to explain the workings of various modern technological marvels. I also have an older edition published in the 60s where each entry is like a short technical document written by engineers making the inventions. The newer versions have many good explanations of how things work that the olders do not have. We will be using the two versions side-by-side in this seminar.

## 3 Detailed Plan

The seminar would meet twice a week, once for 1 hour and once for 2 hours. In the first hour we will look at a class of inventions or an invention or two in depth. The second meeting will start with a technical introduction to a single device or aspect of an invention, followed by time for the building the device. Hopefully, in many cases the students will be able to specify a list of materials for their own attempt at building the particular design.

Students will also research inventions and present them to the class. Each student will be responsible for collecting information on the science, history, and uses of two inventions during the semester. Everyone, however, will be responsible for reading the appropriate sections of The Way Things Work for that invention.

## 4 Syllabus

All assignments are readings from *TWTW* (*The Way Things Work*), *TWTUTW* (the older editions of *The Way Things Work*), and handouts.

Week 1 : Household Inventions (mechanical lock)

Assignment: *TWTW*, lock mechanics handout

In-class project: build a mechanical lock

Week 2 : Household Inventions (clock)

Assignment: *TWTW*, TBD ISP readings

In-class project: build a simple mechanical clock

Week 3 : Household Inventions (sewing machine)

Assignment: *TWTW*, *TWTUTW*

In-class project: build an assisted sewing machine

Week 4 : Engines (steam engine)

Assignment: *TWTUTW*, Unified handouts

In-class project: make steam do work

Week 5 : Mass Transit (subway)

Assignment: city planning handouts

In-class project: fix the Boston mass transit system

Week 6 : Navigation (gyroscope)

Assignment: *TWTUTW*

In-class project: design a system for determining location

Week 7 : Sea Travel (submarine)

Assignment: fluid mechanics handouts

In-class project: build a on-board motor for a boat

Week 8 : Electronics (transistor)

Assignment: circuit theory notes

In-class project: build a simple electronic adder

Week 9 : Communication (radio)

Assignment: *TWTW*, *TWTUTW*

In-class project: build a radio

Week 10 : Recording (surveillance devices)

Assignment: *TWTW*, handouts

In-class project: build a recording device

Week 11 : Space Exploration (telescope)  
Assignment: *TWTUTW*, optics handouts  
In-class project: design a telescope

Week 12 : Space Exploration (satellite)  
Assignment: handouts  
In-class assignment: design a satellite

Week 13 : The Future (brain transplants)  
Assignment: handouts  
In-class assignment: transplant brains