

Scientific method

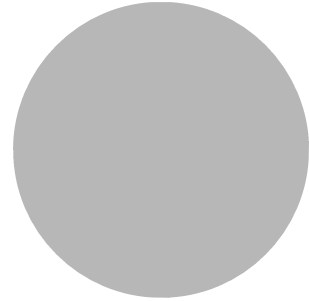
LECTURE 1

Objectives

- ▶ Define terms.
- ▶ Discuss the limitations of science.
- ▶ Describe the basic structure of the scientific method.
- ▶ Explain what makes a good scientific question.
- ▶ Define hypothesis, falsifiable, and null hypothesis.
- ▶ Identify the different types of variables.
- ▶ Design a scientific experiment.

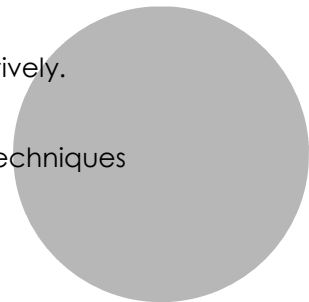
Science

- ▶ The systematic of study of the natural world.
 - ▶ One way of knowing.
- ▶ Empirical and objective
 - ▶ Scientific method



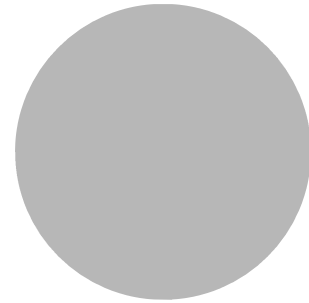
Limits of science

- ▶ Science is limited to questions that can be studied objectively.
- ▶ Science is empirical.
- ▶ Scientific conclusions are subject to change when new techniques or information becomes available.
- ▶ Science proves nothing true.



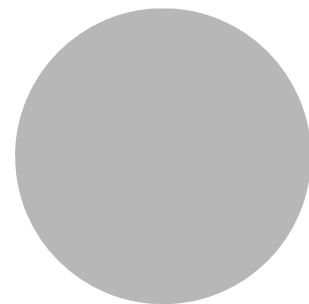
Scientific method

- ▶ Observation
- ▶ Question
 - ▶ Definable
 - ▶ Measurable
 - ▶ Controllable
- ▶ Hypothesis
 - ▶ Falsifiable
 - ▶ Null Hypothesis



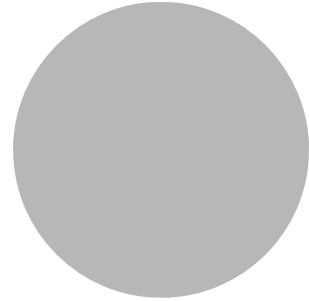
Scientific method

- ▶ Experiment
 - ▶ Define variables (Types of variables)
 - ▶ Dependent variable
 - ▶ Independent variable
 - ▶ Controlled variable



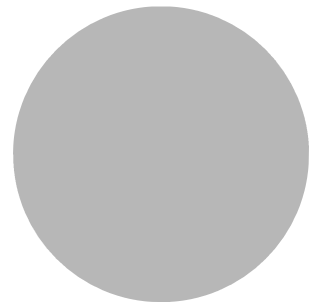
Scientific method

- ▶ Experiment
 - ▶ Procedure
 - ▶ Manipulation
 - ▶ Level of treatment
 - ▶ Measurement
 - ▶ Sample size/replication
 - ▶ Control treatment
 - ▶ Predict the outcome
 - ▶ Execute the experiment



Scientific method

- ▶ Conclusions
- ▶ Communication



Different models of the scientific method

- ▶ Observational vs. experimental science.
- ▶ Differences between a hypothesis, a theory, and a scientific law.