The Rise of Modern Science

I. Course Aims
   a. We're going to cover a lot of material in a short time. The goal is not to memorize names and dates, but to ask larger questions about how science has emerged and changed over time.
   b. We will be highly selective in our choice of topics. For example, we will look mostly at developments in Europe and North America.
   c. We will be guided by three overarching questions
      i. How do we know what we know?
      ii. What are the impacts of science of society?
      iii. How is science shaped by society?

II. What is science?
   a. Scientist
      i. "A person with expert knowledge of science; a person using scientific methods." (scientist, n.
      Second edition, 1989; online version March 2011.
      <http://oed.com/view/Entry/172698>; accessed 13 May 2011. Earlier version first published in *New English Dictionary*, 1910.)
   b. Scientific Methods
      i. Observation
      ii. Hypothesis
      iii. Experiment
      iv. Analysis
         1. Support or reject hypothesis
      v. New hypothesis
      vi. Experiment – etc.

III. How do we know what we know?
   a. Source of scientific authority
      i. Individuals with certifications (degrees)
      ii. Research Institutions (Universities)
      iii. Governments and Foundations (National Science Foundation)
      iv. Publications (Textbooks, journals)
   b. Problems with authority
      i. Hwang Woo Sook
      ii. Jan Hendrik Schön
      iii. Victor Ninov

IV. How does science impact society?
   a. Examples
      i. Industry
      ii. Medicine
      iii. Energy

iv. Art
v. Humor

V. How does society shape science?
   a. Funding
   b. Societal pressures on direction of science
      i. Political
      ii. Legal
      iii. Cultural

VI. Time line
   a. Ancient (500 BCE – 500 AD)
   b. Medieval (500 – 1450)
   c. Renaissance (1450 – 1700)
   d. Enlightenment (1700 – 1850)
   e. Modern (1850 – Today)

VII. Course organization
   a. How to make sense of the past and present?

VIII. Themes for our course: Questions about the world
   a. Unit 1: Matter
      i. Substance of substances of which something consists
      ii. Material used or acted upon
      iii. That which has mass and occupies space
      iv. Questions / Case Study
         1. Is the stuff of the universe unchanging or transmutable?
         2. The institutions of science
   b. Unit 2: Nature
      i. Collective phenomena of the world – especially living things, plants, and animals – often apart from human action
      ii. The essential quality or constitution of a thing
      iii. Questions / Case Study
         1. Are humans a part of nature or do they make nature?
         2. Science and commerce
   c. Unit 3: Motion
      i. Agitation, unrest, disturbance
      ii. The action or process of being moved
      iii. Questions / Case Study
         1. Are motions subject to universal laws?
         2. Science and technology
   d. Unit 4: Bodies
      i. The physical frame or structure of man
      ii. The whole material organism viewed as an organic entity
      iii. Questions / Case Study

1. How do living creatures work>
2. Science and the ethics of research

e. Unit 5: Heavens
   i. The expanse in which the sun, moon, and stars are seen
   ii. The part of the atmosphere closest to the earth's surface
   iii. Questions / Case Study
      1. Are models convenient tools or true representations?
      2. Science and politics

f. Unit 6: Minds
   i. Action of thinking, or occurrence of a thought
   ii. The organ of the human brain
   iii. Questions / Case Study
      1. Is it possible to understand the human brain?
      2. Science, power, and control

IX. How to think about science?

a. Case study: Cholera, 1832 (Contextualize and contrast)
   i. Proposed therapies
      1. Bleeding
      2. Opiates
      3. Electric shock
      4. Tobacco smoke enema
      5. Rectum plugs of beeswax or oilcloth
   ii. Modern therapies
      1. Oral rehydration therapy
      2. Electrolytes
      3. Antibiotics

b. Scientists struggled with difficult problems
c. Be sympathetic and open minded
d. Science shaped by its contexts, both then and now

X. Questions science struggled with

a. Which moves: the sun or the earth?
b. Why are fossils on mountain tops?
c. Can you change lead into gold?
d. What does the heart do?

STS.003 The Rise of Modern Science
Fall 2010