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History 141
Lectures: T/TH 11:00-11:50
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**History 141:
Minds and Worlds, from Aristotle to Newton to Einstein
Spring 2007**

COURSE DESCRIPTION: What is the relation between the physical world, our understanding of it, and the experience we use to create that understanding? People have answered this question differently at different moments, and this course, intended to serve as a broad introduction to the history of science, studies how the sciences have been shaped and re-shaped by their answers. Recent disputes over the accessibility of a world outside our perceptions pick up on very old themes. The notion of an autonomous universe, unchanged by our movements through it, was alien to ancient and medieval, predominantly Aristotelian manners of thinking, but became intuitive at the hands of the makers of the Scientific Revolution, whose efforts culminated in the physics of Isaac Newton. However, having become intuitive, the Newtonian worldview was then undermined by late nineteenth and early twentieth century scientific and philosophical developments, notably the physics of Albert Einstein. The course follows these transformations from Aristotle to Newton to Einstein, and from premodern to modern to postmodern views of nature and knowledge.

ASSIGNMENTS: There will be **two ~5-page analytical papers**, due on **May 11th** and **June 8th**, and a **final exam**. Students who want to use this course to satisfy their **Writing in the Major** requirement will submit drafts of each paper, discuss these with the instructors and perhaps with the other Writing in the Major students, and make revisions in response to these discussions.

Students with disabilities should (1) register with the Disabilities Resource Center [563 Salvatierra Walk, Stanford, CA 94305; TEL: 723-1066 (voice), 723-1067 (TTY)]; (2) inform me during the first week of the existence of the disability (discretion assured).

READINGS: Readings marked with an [R] are contained in a course reader; others are taken from the books listed below; and a couple (with web addresses beneath them) are online. The reader and the books are available for purchase from the Stanford Bookstore and are also on reserve at Green Library.

Galilei, Galileo. *Dialogues Concerning Two Chief World Systems*. Modern Library, 2001 (1632).

Ginzburg, Carlo. *The Cheese and the Worms* (1992 (1976)).

Bacon, Francis. *The Novum Organum*. Cambridge University Press, 2002 (1626).

Descartes, René. *A Discourse on Method, Meditations*, 2003 (1641).

Charles Darwin. *On the Origin of Species*. Harvard UP, 2001 (1859).
Sigmund Freud. *On Dreams*. Norton, 1990 (1901).
Michael Frayn. *Copenhagen*. Anchor Books, 2000 (1998).

Week 1:

Tuesday, April 3rd – **Introductory Lecture**

Thursday, April 5th – **Natural Knowledge in Plato’s Cave**

Reading: Plato, *Phaedo*, *Republic*, *Timaeus* (4th c. B.C.), excerpts [R]

Week 2:

Tuesday, April 10th – **Natural Knowledge and the Aristotelian Cosmos**

Reading: Aristotle, *Physics*, *On the Heavens*, *On Generation and Corruption*, *Meteorology* (4th c. B.C.), excerpts [R]

Thursday, April 12th – **From the Closed World to the Infinite Universe**

Reading: Copernicus, *On the Revolutions of the Heavenly Spheres* (1543), preface [R]

Week 3:

Tuesday, April 17th – **“And New Philosophy calls all in doubt”**

Reading: Galileo, *The Starry Messenger* (1610), excerpts [R]
Kepler, *Epitome of Copernican Astronomy* (1618-1621),
Harmonies of the World (1619), excerpts [R]

Thursday, April 19th – **Bacon’s Idols and Descartes’s Demon**

Reading:
Bacon, *Novum Organum* (1620), Book I, Aphorisms on the Interpretation of Nature I - LXVIII, pp. 33-56 skim (but read carefully XXXIX-LXII, pp. 40-51), and Aphorisms XCV-CIII, pp. 79-83
Boyle, *New Experiments Physico-Mechanicall* (1660), excerpts [R]
Hooke, *Micrographia* (1665), excerpts [R]
Descartes, *Meditations* (1641), First and Second

Week 4:

Tuesday, April 24th – **A New World System**

Reading: Galileo, *Dialogues Concerning Two Chief World Systems* (1632), SKIM pp. 145-218, but READ pages 145-148 and 161-180

Ginzburg, *The Cheese and the Worms* (1976), excerpts to be assigned

Thursday, April 26th – **The Trial of Galileo**

Reading: Indictment and Abjuration of Galileo (1633) [R]

Week 5:

Tuesday, May 1st – **The Newtonian Synthesis**

Reading: Newton, *Principia* (1686), *Opticks* (1730), excerpts [R]

Thursday, May 3rd – **The Physics of Imponderables**

Reading: Benjamin Franklin, *Experiments and Observations on Electricity* (1751), excerpts [R]

Week 6:

Tuesday, May 8th – **To Carve Nature at its Joints**

Reading: Carolus Linnaeus, *The System of Nature* (1735), excerpts [R]
Antoine Lavoisier, *Elements of Chemistry* (1789), preface [R]
John Dalton, *A New System of Chemical Philosophy* (1808),
excerpts [R]

Thursday, May 10th – **The World Spirit, Electromagnetism and the Conservation of Energy**

Reading: Hermann von Helmholtz, “On the Interaction of Natural Forces” (1854) [R]

****First paper due by 5:00 on Friday, May 11th****

Week 7:

Tuesday, May 15th – **Deep Time and the Origin of Species**

Reading: Charles Darwin, *On the Origin of Species* (1859), Intro., Chs. 3 and 4, Conclusion

Thursday, May 17th – **Survival of the Fittest**

Reading: Charles Darwin, *On the Origin of Species* (1859), see above

Week 8:

Tuesday, May 22nd – **Relativity and Relativism**

Reading: Einstein, “What is the Theory of Relativity?” (1919) [R]

Thursday, May 24th – **Quantum Mechanics and Indeterminacy**

Reading: Niels Bohr, *Atomic Theory and the Description of Nature* (1929) [R]

Werner Heisenberg, “The Copenhagen Interpretation of Quantum Mechanics” (1958) [R]

Week 9:

Tuesday, May 29th – **Uncertainties**

Reading: Frayne, *Copenhagen* (1998)

Thursday, May 31st – **A New Theory of Mind**

Reading: Sigmund Freud, *On Dreams* (1901)

Week 10:

Tuesday, June 4th – **Conclusions**

**** Second paper due by 5:00 on Friday, June 8th****

**** Final exam date to be announced ****