

History of Modern Science

HIS 322M — 39720
Fall 2013 — MWF 11–12
GAR 0.102

Prof. Bruce J. Hunt

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Hours: Mon. 12:30–2:30, Weds. 10–11
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In this course, we will survey the development of modern science from the early 18th century to the present. We will examine the growth of scientific ideas and institutions, and will seek to understand the changing place science has held in modern life and thought.

Readings: Thomas L. Hankins, *Science and the Enlightenment*,
Charles Darwin, *Evolutionary Writings* (ed. James A. Secord),
Bruce J. Hunt, *Pursuing Power and Light*,
James D. Watson, *The Double Helix* (Norton Critical Edition, ed. Gunther S. Stent);
plus a packet of readings available from IT Copy.

Course grades will be +/- and will be based on three essay exams (25% each) and a short paper on a topic to be assigned (25%). There will be no separate final. In place of the second exam, you may write a 6–8 page research paper, due on November 1. If you choose to write such a paper, you must meet with me, pick up a set of guidelines, and get an appropriate topic approved by October 16. We will not take daily attendance, but you will need to pay close attention to all lectures to do well in the course. Additional information on course policies will be posted on Blackboard.

Aug. 28 Overview: Science and its history.

Aug. 30 The Scientific Revolution and the Newtonian synthesis.
(Hankins, 1–16.)

Sept. 4 Experimentation and analysis: Newton on light and color.

Sept. 6 Voltaire, du Châtelet, and the reception of Newtonianism.
(Hankins, 28–80; packet reading 1: Voltaire.)

Sept. 9 Thomas Kuhn and the structure of scientific revolutions.

Sept. 11 The Enlightenment and the spirit of analysis.

Sept. 13 Chemistry: from phlogiston to oxygen, and from allegories to formulas.
(Packet reading 2: Kuhn; Hankins, 17–28, 81–112.)

Sept. 16 Natural history: Linnaeus and taxonomy.

Sept. 18 The *Encyclopédie* and the Age of Reason.

Sept. 20 Science under Napoleon: the Laplacians.
(Hankins, 113–51, 158–90; Hunt, 13–19.)

Sept. 23 The wave theory of light.

Sept. 25 Review: the development of the sciences to 1820.

Sept. 27 **First exam** (25%).

Sept. 30 The organization of science in the 19th century.

Oct. 2 Romanticism and the sciences: Goethe, Schelling, Oken, and Humboldt.

Oct. 4 Geology in the early 19th century.
(Hankins, 151–57; packet reading 3: Bowler and Morus on geology.)

- Oct. 7 The “species question” before Darwin.
 Oct. 9 Darwin and the voyage of the *Beagle*.
 Oct. 11 — to be announced —
 (packet reading 4: Paley; Darwin, x–xx, 3–9, 39–66, 89–103, 107–211, 355–97.)
- Oct. 14 Darwin, Wallace, and *The Origin of Species*.
 Oct. 16 **Short paper due** (25%); discussion.
 Oct. 18 Scientific and popular responses to Darwinism.
 (Darwin, xx–xxiii, 212–30, 397–436; packet reading 5: Darwin and Wallace.)
- Oct. 21 Social Darwinism and eugenics.
 Oct. 23 The “eclipse of Darwinism” around 1900.
 Oct. 25 Mendel and genetics.
 (Darwin, xxiv–xxxvii, 334–47; packet reading 6: Bowler on Mendel.)
- Oct. 28 The neo-Darwinian synthesis.
 Oct. 30 Review: the evolution of Darwinism.
 Nov. 1 **Second exam** (25%).
 (Packet reading 7: Bowler on the evolutionary synthesis.)
- Nov. 4 Steam engines and the laws of energy.
 Nov. 6 The mechanical program and the kinetic theory of gases.
 Nov. 8 Faraday, Maxwell, and the electromagnetic field.
 (Hunt, 1–13, 19–119.)
- Nov. 11 Technology and science: electrification.
 Nov. 13 Einstein and relativity; the image of Einstein.
 Nov. 15 The new physics: X-rays, radioactivity, and quanta.
 (Hunt, 120–67.)
- Nov. 18 The atomic bomb.
 Nov. 20 The advent of Big Science.
 Nov. 22 — to be announced —
 (Packet reading 8: Segrè on nuclear energy.)
- Nov. 25 Molecular biology: DNA.
 Nov. 27 *The Double Helix* and “Honest Jim.”
 (Watson, xi–xxv, 1–133, 137–45, 185–94, 207–34, 237–41.)
- Dec. 2 Review: the physical sciences since 1820.
 Dec. 4 Science and the modern world; course evaluation.
 Dec. 6 **Third exam** (25%).

Religious holy days: If a religious holy day will force you to miss a class or exam, notify Prof. Hunt at least two weeks in advance and he will give you an opportunity to make up the missed work within a reasonable time after the absence.

Students with disabilities: On request, UT provides appropriate academic accommodations for qualified students with disabilities. For information, contact Services for Students with Disabilities at 512-471-6259 or 512-410-6644 (video phone).