

ILS 202: Western Culture: Science, Technology, Philosophy II
Fall 2006

Professor Lynn Nyhart 7127 Social Science Bldg. lnyhart@wisc.edu
Office Hours: Wednesdays 1:20-3:15 and by appointment. 262-3492

Teaching Assistant: Judy Holst, 302 Meiklejohn, 265-8088, office hrs TBA.

Welcome to ILS 202! This course offers an introduction to the history of the sciences between the late seventeenth century and the early twentieth century, with the aim of understanding the varied ways of knowing that have come to be known as “science.” In pursuing this question, we will treat such pivotal intellectual developments as Newtonianism, the conservation of energy, and Darwin's theory of evolution. At the same time, we will seek to understand the relationship between these ideas and the broader cultural context in which they took place, paying particular attention to the processes by which scientists and non-scientists have assimilated new information and changed their ideas about nature. We will see how scientific ideas have developed in relation to religious belief systems, on the one hand, and technology and medicine, on the other. These big, messy, important relationships are among the most important in our culture's history and remain central to understanding the condition of modern Western and global culture today.

Grading:

25 %: Participation in discussion sections (including 7 informal writing assignments)
25% each: Three take-home essay exams of approximately 1250 words each. The final essay will ask you to draw on the course as a whole, with emphasis on the final unit.

Major Due Dates: Wednesday, October 11 IN CLASS: 1st essay;
Wednesday, November 8 IN CLASS: 2nd essay;
Tuesday, December 19, NOON : Final essay (due in Judy's box)

Your **word-processed, double-spaced** essays are due **at lecture on the due date** unless otherwise specified. It is a good idea to keep both an electronic and a hard copy for yourself.

Books available for Purchase: (University Book Store or Underground Textbook Exchange):

Peter Bowler and Iwan Morus, *Making Modern Science* (“B&M” in course schedule)

Paul Lawrence Farber, *Finding Order in Nature: The Naturalist Tradition from Linnaeus to E. O. Wilson* (“Farber” in course schedule)

H. G. Wells, *The Time Machine*

Course Reader and Study Guide: (2 different booklets) available for purchase (cash or check, payable to “History of Science”) at the Department of History of Science, 7143 Social Science Building. Readers and study guides are **nonrefundable**; once you've bought one, it's yours.

A copy of all readings is on reserve at College Library.

Course Website. We will be using “Learn@UW,” an interactive course website, for distributing writing assignments and handouts and for important website links and other information. To access the Learn@UW site for ILS 202, follow these two steps:

1. Open up an Internet browser and go to this website (which you should then bookmark):
<https://uwmad.courses.wisconsin.edu/>
This is your “login page” for Learn@UW. You will need to type in your WiscWorld username and password to get to the next screen, which is your “portal page.” Notice that on this page there is information about the “Help Desk” if you have any trouble navigating to the site or getting any of the information. The Help Desk is available to assist you around the clock, so please contact this number (264-HELP)!
2. Once on your Learn @UW portal page, you will see a box called “**My Madison Courses**” which will list all your UW courses that have a Learn@UW website. Click on the link under this heading for “ILS 202” and you’ll arrive next at the course website.

Course objectives:

This course is designed to help you achieve a variety of goals. In terms of content, the basic goals are:

- to learn in some detail how reliable knowledge of nature has been constituted over time (issues of scientific method);
- to learn to view science as a living, changing enterprise made by people responding both to nature and also to their own material needs and belief systems; and
- to learn some basic scientific concepts, how they came into being, and how they have mattered in Western culture.

But this course also serves a larger purpose: to improve your ability to think historically and critically about science. This involves developing several skills:

- how to ask good questions about information you encounter;
- how to break down a big question into manageable pieces;
- how to think synthetically, to piece together patterns from diverse pieces of evidence
- how to make and defend critical/analytical arguments.

While the content goals will help you gain greater scientific and cultural literacy, the historical thinking goals will help you develop and cement skills that you can transfer to many other realms. This course is designed to challenge you on both fronts, while also stimulating you to think in new ways about science and its place in Western culture.

Lecture/Reading Schedule

Readings marked with * are in your course reader.

Week 1: Introductions

9/7: *Course Introduction: Science, Knowledge, and Power*

****Be sure to go to discussion sections this week!****

Unit I: Knowledge of Nature in the Enlightenment

Week 2: Legacies of the Scientific Revolution

9/11: *On the Edge of the Enlightenment*

B&M 23-25, 33-45, 322-326

9/13: *Newton's Syntheses*

B&M 46-52

*Isaac Newton, *Principia*, (1729) Definitions; Laws; Book III: The System of the World: "Rules of Reasoning;" General Scholium.

Week 3: The Enlightenment Democratization of Knowledge

9/18: *Demonstrating Newtonianism, Spreading Enlightenment*

B&M 367-371 (bottom)

*Dobbs and Jacob, *Newton and the Culture of Newtonianism*, 71-95.

*John T. Desaguliers, *Course of Experimental Philosophy*, Introduction and selection from Lecture III.

9/20: *The French Enlightenment*

*Mary Terrall, "Émilie du Châtelet and the Gendering of Science," *History of Science* 1995, 33: 283-310.

Week 4: Matter and Soul in the Eighteenth Century: New Problems for Natural Philosophy

9/25: *Accommodating New Phenomena: The Nature of Matter, from Atomic Attraction to Subtle Fluids*

*J. T. Desaguliers, "Some Thoughts and Experiments concerning Electricity"

*Broman, "Matter, Force, and the Christian Worldview in the Enlightenment"

9/27: *Living Matter and the Problem of the Soul*

*Trembley, "Memoirs concerning the Natural History of a Type of Freshwater Polyp"

Week 5: Enlightenment Natural History

10/2: *Travel, Collecting, and Empire*

*Sverker Sörlin, "Ordering the World for Empire," *Osiris* 2001, 15: 51-69.

Receive first essay assignment

10/4: *The Projects of Classification: Linnaeus and Buffon*

Farber chapter 1, pp. 6-21.

Unit II: Science as Useful Knowledge (1760s-1880s)

Week 6: Revolutionizing Knowledge of Nature

10/9: Science and Technology in the Industrial Revolution

B&M 391-403

*D.S. L. Cardwell, *Turning Points in Western Technology* (New York: Science History Publications, 1972), 102-127

*Jenny Uglow, *The Lunar Men: Five Friends Whose Curiosity Changed the World* (New York: Farrar, Straus and Giroux, 2002), xiii-xx

10/11: From Natural Philosophy to “the Sciences” to “Science”

B&M 55-57, 61-77

*[William Whewell], “On the Connexion of the Physical Sciences. By Mrs. Somerville.” [book review]. *Quarterly Review*, 1834, 54-68 (selections).

First essay due at lecture Oct. 11.

Week 7: Science in the Service of Technology, Nation, and Empire

10/16: Work and Worldview: The Conservation of Energy in Britain

B&M 79-95

10/18: National Styles in Physics: Britain and Germany

B&M, 95-101, 403-407

*Bruce J. Hunt, “Doing Science in a Global Empire: Cable Telegraphy and Electrical Physics in Victorian Britain,” in Bernard Lightman, ed. *Victorian Science in Context* (Chicago and London: U. of Chicago Press, 1997), 312-333

Week 8: Physiology, Queen of the Medical Sciences?

10/23: The Animal Machine: Force and Physiology

B&M 95-97 (review), 174-178

*Cynthia Eagle Russett, ch. 4, “The Machinery of the Body,” in idem, *Sexual Science* (Cambridge, Mass.: Harvard University Press, 1989), 104-129, 223-227

10/25: The Experimental Method

B&M 178-183

Farber, 72-80

*“Claude Bernard (1813-1878)” and *Introduction to the Study of Experimental Medicine*, (selections), translated by A. S. Weber. In Weber, ed. *Nineteenth Century Science: An Anthology* (Broadview Press, 2000), 315-17, 322-336.

*Anita Guerrini, *Experimenting with Humans and Animals: From Galen to Animal Rights* (Baltimore: Johns Hopkins University Press, 2003), 86-92.

Week 9: New Approaches to Disease

10/30: Inventing “Germs”

*David V. Cohn, “The Life and Times of Louis Pasteur,”

<http://www.foundersofscience.net/interest1.htm>. (Go to this website to see the illustrations in color.)

*Louis Pasteur, *Studies on Fermentation: The Diseases of Beer, Their Causes, and the Means of Preventing Them*, tr. Frank Faulkner and D. Constable Robb (London:

Macmillan, 1879; New York: Kraus Reprint Co., 1969), 1-6, 18-32.

Receive second essay assignment

11/1: *"Scientific" Medicine and Public Health*

B&M 439-441, 446-450

*Bert Hansen, "America's First Medical Breakthrough: How Popular Excitement about a French Rabies Cure in 1885 Raised New Expectations for Medical Progress," *American Historical Review*, April 1998, 373-418

Unit III: Time's Arrow: The Historical Sciences (1800-1915)

Week 10: Progress and the Sciences of the Past

11/6: *The Earth Acquires a History*

B&M 103-115

*Mott. T. Greene, "Genesis and Geology Revisited: The Order of Nature and the Nature of Order in Nineteenth-century Britain," in *When Science and Christianity Meet*, ed. David Lindberg and Ronald L. Numbers (University of Chicago Press, 2003), 139-159, 302-304.

11/8: *Change, Progress, and the History of Life*

B&M 115-124

*Charles Lyell, *Principles of Geology*, vol. 1 (1830) (selections)

Second essay due at lecture, 11/8

Week 11: Darwinian Evolution

11/13: *The Evolution of Darwin's Theory*

B&M 129-149

Farber 37-42; 56-63

11/15: *Darwin's Theory: The Great Gestalt Shift*

Farber, 56-63

*Charles Darwin, *On the Origin of Species* (1859) chapter 4, "Natural Selection," from Mark Ridley, ed., *The Darwin Reader* (2ed) (W. W. Norton, 1996), 101-126.

Week 12: Darwinian Evolution (cont.)

11/20: *The Significance of Darwinism for Science* (Lecture/Discussion)

B&M 149-157, 161-162

11/22: Film: *Proteus*

Thanksgiving Break: No discussions this week

Week 13: The Social Uses of Evolution

11/27: *Evolution as a World-View Issue*

B&M 354-360

Farber, 63-71

11/29: *Evolution, Race, and Empire*

B&M 415-17, 420-431

*"Sir Francis Galton (1822-1911)," and "The Comparative Worth of Different Races,"

from *Hereditary Genius: An Inquiry into Its Laws and Consequences*. (London: Macmillan, 1869), pp. 336-350. In Weber, ed. *Nineteenth Century Science: An Anthology* (Broadview Press, 2000), 345-355.

Week 14: Science at the Fin de Siecle

12/4: *The Down-Side of Progress: Entropy and Degeneration*

H. G. Wells, *The Time Machine*, first half.

12/6: *Time Changes*

Finish H. G. Wells, *The Time Machine*

Week 15: Looking Forward and Backward

12/11: *Physics ca. 1914*

B&M 253-265

12/13: *The Big Picture: What does it all mean?*

*Alfred Russel Wallace, *The Wonderful Century: Its Successes and Its Failures* (London: Swan Sonnenschein and Co., 1898), pp. 150-157. In Weber, ed. *Nineteenth Century Science: An Anthology* (Broadview Press, 2000), 478-480.

Final Essay due Tuesday, December 19, at NOON in Judy Holst's mailbox

Academic Performance and Accommodation:

Extensions are only granted if requested before the due date, and only in case of illness or other serious emergency. (A printer failure does not qualify.) All extensions will have a definite new due date established. Papers received after the new due date will be subject to late paper penalties.

Late paper policy: any piece of writing that you hand in late without an extension will have the following penalties assessed: a quarter of a grade for every working day late. For example, if the paper on its merits deserves a B (3.0 on a scale of 4), after one day it would receive a B/BC (2.75), after two days a BC (2.5), after three a BC/C (2.25), after four a C (2.0). NOTE: LATE TAKE-HOME FINAL EXAMS WILL NOT BE ACCEPTED.

Plagiarism: See Study Guide.

Appealing a grade: If you have questions about a grade, you should first talk to the teaching assistant who gave you the grade. If the problem is not resolved, come talk to me. If we cannot come to a satisfactory conclusion, the next step is for you to speak with the ILS Chair, Prof. Craig Werner. He will attempt to resolve the issue informally and inform you of the appeals procedures if no resolution is reached informally. This set of steps is in line with L & S policy and should be available to you in any course, not just this one.

Access and Accommodation: I will make every effort to honor requests for reasonable accommodations made by individuals with disabilities. (If you think you qualify for accommodation, please contact the McBurney Disability Resource Center [263-2741; <http://jumpgate.acadsvcs.wisc.edu/~mcburney/>] to establish your eligibility for services.) Requests for accommodation can be responded to more effectively if I receive them as far in advance as possible, preferably at the beginning of the semester. Such requests are confidential.

Religious Observance: If religious holidays or observances conflict with your participation in this course, please come talk to me **well in advance** for us to work out alternative arrangements.

If any other problems arise, either academic or personal, which might jeopardize your performance in the course, you must try to inform Prof. Nyhart after lecture or by the soonest available office hour, or by leaving a message with the History of Science department administrator (262-1406).