

ILS 202: Western Culture: Science, Technology, Philosophy II Fall 2010

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Lectures: MW 11-11:50, 168 Noland Hall. Discussions: R 2:25, 3:30 in CompSci&St 1289; F 9:55, 11:00 in 103 Meiklejohn House (living room). Please attend the section you signed up for!

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 goal, we will treat such pivotal intellectual developments as Newtonianism, the conservation of energy, and Darwin's theory of evolution. We will also seek to understand the relationship between these ideas and the broader cultural context in which they took place, paying particular attention to the ways it was possible to “do science” in different times and places. 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:

- 30 %: Attendance at lecture and participation in weekly discussion sections, including informal writing and any other discussion section requirements, as well as 3 “Beyond the texts” exercises. (See separate “Beyond the texts” handout.)
- 20% Unit I take-home essay (1200 words), due in the ILS 202 L@UW Dropbox by 10:30 a.m. **Wednesday, October 13;**
- 20% Unit II take-home essay (1200 words), due in the ILS 202 L@UW Dropbox by 10:30 a.m. **Monday, November 15;**
- 30% Unit III take-home essay (1500 words), due in the ILS 202 L@UW Dropbox by **NOON on Monday, December 20.** The final essay will give you the option of drawing on the course as a whole in your answer.

All formal writings should be **word-processed and double-spaced**. Essays should include your name, section number/time, date, and a descriptive title (not “Unit 1 essay” or “Question 1”) at the top. It is a good idea to keep both an electronic and a hard copy for yourself. See “Introductory Course Materials” on Learn@UW for details on policies concerning late papers, plagiarism, learning accommodations, and academic performance.

Books available for Purchase: (University Book Store):

Peter Bowler and Iwan Morus, *Making Modern Science* (“B&M” in course schedule)
H. G. Wells, *The Time Machine* (Broadview edition only)

Course Reader: available for purchase (cash or check, payable to “History of Science”) at the Department of History of Science, Bradley Memorial Building, 1225 Linden Drive. Readers are **nonrefundable**. Once you’ve bought one, it’s yours.

Study Materials are online at on the course Learn@UW website. You’ll need to print them

up (and use them!) before the class at which the work is due. These will be collected from time to time to make sure you are filling them out.

A copy of all readings (but not the study materials) 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. Go to <http://learnuw.wisc.edu>, or access it from the UW home page. Click on “UW Net ID Login,” then at the next screen, type in your WiscWorld username and password to get to the next screen, which is your Learn@UW “portal page.” Notice that on this page there is a red “Help” button to click on 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 (and not Anna or me!).
2. Once on your Learn @UW portal page, you will see a column in the middle called “My Courses,” which will list all your UW courses that have a Learn@UW website. Look for “2010 FALL;” you may need to expand that semester by clicking on the “+” button. Click on the link under this heading for “ILS 202” and you’ll arrive at the course website.

Note the navigation bar at the top of the page, above the course title banner. Most of the information for the course is listed under the “Content” tab. Essays and “Beyond the Texts” exercises are to be uploaded to the “Dropbox.” You may have use for the other tabs, depending on your situation and how discussion sections are structured.

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;
- to learn some basic scientific concepts, how they came into being, and how they have mattered in Western culture; and
- to understand how past science—even long-past science—has shaped the world we live in today.

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.

Honors: You may take this course for honors credit, whether or not you are in the honors program. To receive honors credit, you must register for the honors option, do the extra work outlined on the separate Honors Syllabus, and earn a 3.5 (AB) grade or higher in the course as a whole.

Course Schedule

Readings are listed beneath lecture titles for each lecture date. Those marked with * are in your course reader.

Note: there are NO DISCUSSIONS on Thursday and Friday, Sept. 2-3.

Week 1: Introductions

9/8: *Course Introduction: Science, Knowledge, and Power*

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

9/9-9/10: Print up and read "Introductory Course Materials" (on Learn@UW) for section.

Unit I: Understanding Nature, 1665-1805

Week 2: Legacies of the Scientific Revolution

Beyond the Texts: (due 9/19) "Looking Up: An Exhibit of Astronomical Books, 1500-1800," Memorial Library Special Collections, 9th Floor, Memorial Library, open 9-5 M-F.

M 9/13: Experimental Knowledge and the Mechanical Philosophy

B&M, 23-25, 33-52, 322-326

*Robert Crease, "*Experimentum Crucis*: Newton's Decomposition of Sunlight with Prisms," chapter 4 in *The Prism and the Pendulum*, 59-76.

*Isaac Newton, "A New Theory about Light and Colours" (1672), as excerpted by William Francis Magie, ed., *A Source Book in Physics* (Cambridge: Harvard U. Press, 1963), 298-305.

W 9/15: Newton's Syntheses

*Isaac Newton, *Principia* (1729), Definitions; Laws; Book III: The System of the World: "Rules of Reasoning;" General Scholium. Adapted from <http://members.tripod.com/~gravitee/>.

*I. Bernard Cohen, "Franklin's Scientific Style," in idem, *Benjamin Franklin's Science* (Cambridge, MA: Harvard University Press, 1990), 14-17 only.

Week 3: Expanding the Framework: Experiment and Explanation

Beyond the Texts (due 9/26): visit "Planet Trek," a model of the solar system, on bike paths between Monona Terrace and Mt. Horeb.

M 9/20: Spreading Enlightenment

B&M, 367-371 (bottom)

*I. Bernard Cohen, "Franklin's Scientific Style," 17-30

*Dobbs and Jacob, *Newton and the Culture of Newtonianism* (1995), 71-95, 123-4.

*J. T. Desaguliers, *Course of Experimental Philosophy* (1734), Introduction

*J. T. Desaguliers, "Some Thoughts and Experiments concerning Electricity" (1739-41).

*Letter 3 from Benjamin Franklin to Peter Collinson, Sept. 1, 1747, as reprinted in *Benjamin Franklin's Experiments: A New Edition of Franklin's Experiments and Observations on Electricity*, ed. I. B. Cohen (Cambridge, MA: Harvard University Press, 1941), 179-186.

W 9/22: Explaining Living Matter

*Abraham Trembley, *Memoirs concerning the Natural History of the Polyp* (1744).

Translated and edited by Sylvia G. Lenhoff and Howard M. Lenhoff, in *Hydra and*

the Birth of Experimental Biology–1744. (Pacific Grove, CA: Boxwood Press, 1986).
Excerpts from the First and Fourth Memoirs, pp. 1-11, 182-188, Plates 11-13.

*Thomas H. Broman, "Matter, Force, and the Christian Worldview in the Enlightenment,"
in *When Science and Christianity Meet*, ed. David C. Lindberg and Ronald L.
Numbers (Chicago: University of Chicago Press, 2003), pp. 85-109.

Week 4: Science and Global Adventuring

Beyond the Texts (due 10/3): UW Botanical Garden

9/27: Global Positioning

*Mary Terrall, "Heroic Narratives of Quest and Discovery," *Configurations: A Journal of Literature, Science, and Technology* 1998, 6: 223-242.

*Richard Holmes, *The Age of Wonder* (NY: Random House, 2008), 1-21, 33-35, 38-40.

9/29: Enlightenment Natural History

Farber, pp. 6-21.

Carl von Linné, *Philosophia botanica*, tr. Stephen Freer. (Oxford University Press, 2003),
pp. 219-226, 328-35. (Posted on L@UW under Content>Readings.)

Visit Linnaeus' reconstructed garden at:

<http://www.linnaeus.uu.se/tradgardsvandring/indexEng.php>

Be sure to click around its different parts.

Week 5: The End of the Enlightenment Paradigm(s)?

Beyond the Texts (due 10/10): Science-related art on campus

10/4: Alexander von Humboldt and Global Physics

*Michael Dettelbach, "Humboldtian Science," In *Cultures of Natural History*, ed. N.
Jardine, J. A. Secord and E. C. Spary (Cambridge, England: Cambridge University
Press, 1996), 287-304.

Receive first essay assignment at lecture (material covered through 10/6)

10/6: Romanticism and the Value of Subjectivity

*Nicholas Jardine, *The Scenes of Inquiry* (Oxford: Clarendon Press, 1991), 37-55

*J. W. von Goethe, "The Metamorphosis of Plants" (poem) in idem, *The Metamorphosis of Plants*, tr. Douglas Miller, introduction by Gordon L. Miller (Cambridge, MA: MIT Press, 2009), 1-3.

*Holmes, *Age of Wonder*, 314-317, 325-330

*Mary Shelley, *Frankenstein* (New York: New American Library, 1982), 42-68.

Unit II: Improving on Nature

Week 6: The Scientist as Technical "Improver" and Entrepreneur

Beyond the Texts (due 10/17): Wisconsin Bioenergy Summit, Thurs. Oct. 14

10/11: The Culture of Improvement

*Robert Friedel, *A Culture of Improvement*, ch. 13, "Artisans, Philosophes, and
Entrepreneurs," 235-254

B&M, 391-398

10/13: The Science and Technology of Power

B&M, 398-403 (more below)

*Friedel, *A Culture of Improvement*, ch. 11, "Raising Fire," 191-209

Essay 1 due at lecture

Week 7: Energy and Empire in Britain

Beyond the Texts (due 10/24): Communications infrastructure

10/18: *The Conservation of Energy in Britain*

B&M, 79-95

[Henry Roscoe], "Thermo-Dynamics," *Edinburgh Review*, Jan. 1864, 243: 1-26 (posted at L@UW: Content>Readings)

10/20: *Electricity and Empire*

B&M, 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: University of Chicago Press, 1997), 312-333.

Week 8: Chemistry at the Intersections of Science and Industry

Beyond the Texts (due 10/30): "Plastic. Fantastic?" exercise

10/25: *The "New" Chemistry and the Method of Analysis*

B&M, 55-78

*William H. Brock, *The Norton History of Chemistry* (NY: Norton, 1992), 173-75, 177-182, 194-209.

10/27: "Nature, Aided by Chemistry": *Light, Color, and Coal*

*Robert Friedel, *A Culture of Improvement*, ch.18: "Stuff, Reality, and Dreams" (selection), 341-354

10/28-29: DISCUSSION SECTIONS MEET AT MEMORIAL LIBRARY SPECIAL COLLECTIONS, 9th floor Memorial Library

Week 9: Improving Life

Beyond the Texts (due 11/7): "Against the Odds: Making a Difference in Global Health." Exhibit at Ebling Library, Health Sciences Learning Center, 750 Highland Ave (take the 80 bus west).

11/1: *Pasteur and the Agricultural Origins of "Germs"*

*David V. Cohn, "The Life and Times of Louis Pasteur," <http://www.foundersofscience.net>. (Go to this website, click on "Pasteur," and scroll down 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 (1879)

11/3: "Scientific" *Medicine and Public Health*: Guest Lecture, Bridget Collins

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" (1998)

11/4-5: Discussion Sections: No Anna. Informal meetings for Timelines catch-up.

Week 10: Geology and Progress

Beyond the Texts: Geology Museum (also week 11; due 11/21)

11/8: *Unit 2-3 Transition: Geology between the Industrial Revolution and the Philosophy of Time*
No Reading: Work on Unit II essay.

Unit III: Sciences of History and Progress

11/10: *The Earth Acquires a History*

B&M, 103-115, 341-3, 347-354

*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*, David Lindberg and Ronald L. Numbers, eds. (University of Chicago Press, 2003), 139-159, 302-304.

Week 11: The History of Life on Earth

Beyond the Texts: Geology Museum (second chance! due 11/21)

11/15: *Change, Progress, and the History of Life*

B&M, 115-124, 132-143

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

Essay 2 due at lecture

11/17: *The Evolution of Darwin's Theory*

B&M, 143-149

*Sandra Herbert and David Norman, "Darwin's Geology and Perspective on the Fossil Record," in *The Cambridge Companion to the "Origin of Species,"* Michael Ruse and Robert J. Richards, eds. (Cambridge: Cambridge University Press, 2009), 129-152.

Week 12: Darwinian Evolution

Beyond the Texts (due TUESDAY, 11/30): Evolution exhibits, 123 Noland Hall

11/22 : *Darwin's Theory and Its Consequences: The Great Gestalt Shift*

*Charles Darwin, *On the Origin of Species* (1859) chapter 4, "Natural Selection."

B&M 149-57, 161-162, 354-62

11/24: *Evolution, Art, and Religion*

Film: *Proteus* (to be shown during class)

11/25-26: Thanksgiving: No discussion sections

Week 13: Evolutionary Naturalism: More Consequences

Beyond the Texts (due 12/5): "Unwitting Participants" exhibit at Ebling Library, Historical Reading Room

11/29: *The Significance of Darwinian Evolution for Science and Society*

*Darwin Correspondence Project: letters to and from Adam Sedgwick (2525, 2548, 2555, all in 1859), Asa Gray (2767, 2814, 3342, dated 1860-61). From:

<http://www.darwinproject.ac.uk/>

*“Adam Sedgwick (1785-1873)” in David Hull, *Darwin and His Critics* (Chicago: University of Chicago Press, 1983), 155-170

12/1: *Evolution, Race, and Intelligence*

B&M, 420-431

*John Carson, *The Measure of Merit: Talents, Intelligence, and Inequality in the French and American Republics, 1750-1940* (Princeton: Princeton University Press, 2007), 75-97, 308-316

*“Sir Francis Galton (1822-1911),” and “The Comparative Worth of Different Races,” from *Hereditary Genius: An Inquiry into Its Laws and Consequences*. (1869), 30, 325-337. *The Down-Side of Progress: Degeneration*

Week 14: The Down-Side of Progress

12/6: *Evolution and Degeneration*

H. G. Wells, *The Time Machine*, 55-112, 157-168

12/8: *The End of Nature? Entropy and the Cosmological Future*

H. G. Wells, *The Time Machine*, 112-156, 225-234

Week 15: Looking Backwards

12/13: *Science at the Brink*

*Alfred Russel Wallace, *The Wonderful Century: Its Successes and Its Failures* (London: Swan Sonnenschein and Co., 1898), pp. 150-156, 367-379.

12/15: *The Big Picture: What does it all mean?*

receive final essay question

***Final essay due Monday, December 20, by NOON in ILS 202 Learn@UW drop-box.**

