

Fall 2008
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HIST 3328.001

History and Philosophy of Science: Perspectives

W 4:00-6:45 pm JO 4.102

“There was no such thing as the Scientific Revolution, and this course is about it.”

Pre-requisites:

HIST 1301, HIST 1302, HIST 2301, HIST 2330, HIST 2331, or equivalent. Pre-requisite may be waived for UTeach students with permission of instructor. This course is especially designed for those training to be elementary and secondary science and mathematics teachers including UTeach students and others interested in the interdisciplinary relations of science and the humanities, such as pre-health majors, and others pursuing the minor in Medical and Scientific Humanities (MaSH).

* * * *This course counts toward the Minor in Medical and Scientific Humanities (MaSH)* * * *

Course Description:

Where did science come from? How did human beings begin to make sense of the natural world and their part in it? How are the same processes of imagination, invention and discovery still at work today in shaping human cultures' understanding of natural phenomena? What roles did those from various knowledge bases and “disciplinary” backgrounds play in the evolution of science?

In this interdisciplinary history course we will ask those questions (and more!) as we read and discuss texts of natural philosophy, the history of science, scientific biography and literature. We will trace the origins and development of western science and its construction of natural knowledge from the ancient world through the age of Newton (approximately 1750). From philosophical, scientific and literary points of view, we will explore whether there was any such thing as the “Scientific Revolution,” and if so, how the “revolutionary” changes in world views influenced human life on social, political and personal levels.

We will center our exploration on this set of thematic questions: What is “nature”? What is “natural”? What is “supernatural”? How do our ever-changing definitions of such concepts alter our ideas about what it means to be “human” (not to mention “male” and “female”)? Do we “discover” order in the universe or do we “invent” it? What is the role of the human imagination upon and within “cosmos”? How has the meaning of the term “science” evolved from its earliest origins through the 18th century? Why? and with what results? How did the relationships between (and relative values and roles of) imagination, faith and reason shift from the ancient world through the early modern period?

Class meetings will include lecture, discussion, films and student presentations as we examine developments in magic and alchemy, astronomy and cosmology, natural history, the history of medicine, early life sciences, and the beginnings of experimental science.

NO TECHNICAL or SCIENTIFIC BACKGROUND IS REQUIRED. Most historical and scientific information will be provided to the class in lecture format. Student research projects and presentations will focus on connecting the historical and literary “perspectives” on the Sci. Rev. presented in class to modern (18thc to contemporary) developments in science, through a relevant scientific biography or autobiography of the students' choice. UTeach program participants will create lesson plans

and class lessons that incorporate relevant scientific biographical / autobiographical materials for their projects and presentations.

Course objectives:

Students will read and discuss a wide variety of literary and historical texts, demonstrating the ability to interpret and analyze themes and issues using various critical methods, including formal, historical, biographical and cultural approaches. Students will research and present an oral report and analytical and interpretative paper or will research and present a lesson plan and class lesson, using primary and secondary sources.

REQUIRED Primary Texts in literature and science:

Christopher Marlowe, *Dr Faustus*

John Donne, selected poems (handout or electronic reserve)

Samuel Butler, "Elephant on the Moon" (handout or electronic reserve)

James Thomson, Ode, "To the Memory of Sir Isaac Newton" (handout or electronic reserve)

Fontenelle, *Conversations on the Plurality of Worlds*

Jonathan Swift, *Gulliver's Travels*

Baigrie, Brian, *Scientific Revolutions: Primary Texts in the History of Science* (anthology)

REQUIRED Secondary Readings in history and philosophy of science:

Kuhn, Thomas. *The Structure of Scientific Revolutions*

Shapin, Steven. *The Scientific Revolution*

Hankins, Thomas, *Science and the Enlightenment*

One scientific biography or autobiography, students' choice, in consultation with professor.

* Students will prepare an in-class presentation and brief written critique of a scientific biography or autobiography, offering a personal "life" perspective on a topic of their choice, such as: history of medicine, astronomy and cosmology, natural history and evolutionary theory, women's lives in science, interrelations of science and religion, nature of scientific creativity and genius.

Grading/ Course Requirements

Attendance and participation (A&P)*, including any quizzes, study sheets etc = 25%

Midterm (1st unit exam, in-class essay and objective portion) = 25%

2nd unit exam (format tba) = 25 %

One 3-5 pp analysis / lesson plan and 7-8 min. in-class presentation / instructional mini-lesson over a scientific biography or scientific autobiography (the revised, polished written component will be due the first day of Finals week, Dec 11); averaged to = 25% of grade

* Optional extra credit/enrichment opportunities may be used to enhance A&P grade. Listen for more info on these in class.

COURSE CALENDAR/ DAILY ASSIGNMENTS

This course has been organized into two central units, 1: Ancient and Medieval World Views: Foundations of “Revolution”? and 2: “New Science”: the “Mechanical” World View of Mathematics and Experimentation. Most class periods will be divided into two halves (before and after a 10-15 min. break). You should have all readings listed under a particular class day, read FOR that class day.

UNIT ONE: Ancient and Medieval World Views: Foundations of “Revolution”?

wk 1: W. Aug 27

Pick up syllabus and course materials from GA. Fill out Index cards. Take roll.

Library Research Workshop (attendance is required):

In McDermott Library – LOBBY: *ISIS Cumulative Bibliography* for the History of Science, *MLA Bibliography*, *MLA Style Guide*, and other research databases and tools.

* Course management hint: Start reading and keeping notes on discussion materials listed below. Also, start browsing for a scientific biography or autobiography to use as the basis for your paper and presentation or lesson and lesson plan. *

wk 2: W. Sept 3:

A) 45m: Intro. to Course: Structure, Expectations, Definitions. What is History of Science?

B) 1.45m: Double Lecture (whoo-hoo!): Origins of Human Knowledge of Nature in Prehistory; and Early History Natural Philosophy and Cosmology in the Ancient Greek World

wk 3: W. Sept 10:

A) 1.15m: Lecture: Science in the Middle Ages: Magical and Animistic World Views

B) 1.15m: Read and Discuss: Marlowe, *Dr. Faustus* (whole book) and
Baigrie, *Scientific Revolutions (SR)*, pp. 1-15 and 62-70

wk 4: W. Sept 17:

A) 1.15m: Lecture: Biology and Medicine: From Galen to Vesalius and Harvey

B) 1.15m: Read and Discuss: Baigrie, *SR*, 40-55; 71-87; 108-114

wk 5: W. Sept 24:

A) 1.15m: Lecture: Was there a Scientific Revolution? The Case for Copernicus

B) 45m: Read and Discuss: John Donne, selected poems; Baigrie, *SR* 16-30; and Shapin, Intro, Chp 1, pp 1-64.

30m: Student Presentations 1, 2, 3 _____/_____/_____

wk 6: W. Oct 1:

Quick Quiz?

A) Lecture: The “New” Astronomy and Physics of Tycho, Galileo, Kepler and Gilbert

B) 30m: Read and Discuss: Baigrie, *SR*, 56-61; 88-98.

45m: Student Presentations 4, 5, _____ / _____
6, 7 _____ / _____

wk 7: W. Oct 8:

A) 2 hr: View film and discuss: “Galileo’s Battle for the Heavens” (NOVA, 120m)

B) 30m: Discuss film; go over Exam format, study hints

wk 8: W. Oct 15: * * * 2 Hour MIDTERM, with in-class essay and objective sections * * *

UNIT 2: “New Science”: the “Mechanical” World View of Mathematics and Experimentation

wk 9: W. Oct 22:

A) 1.15m: Lecture: The Newtonian Achievement

B) 45m: Read and Discuss: James Thomson, “Ode: To the Memory of Sir Isaac Newton”; Butler, “Elephant on the Moon”; Baigrie, *SR* 99-107, 133-151; Kuhn, *Structure of Scientific Revolutions*, Chps I - VI, pp. 1-91

30m: Student Presentations 8, 9, 10: _____ / _____ / _____

wk 10: W. Oct 29: * *EXTRA CREDIT HISTORY OF SCIENCE COSTUME PARTY!* *

A) 1.15m: Lecture: Post-Newtonian Astronomy and Cosmology.

B) 45m: Read and Discuss: Baigrie, *SR* 175-188; Hankins, Chp 1: pp.1-16; Fontenelle, *Conversations on the Plurality of Worlds*; Kuhn, *Structure of SR*, Chps VII-Postscript, pp. 92-210.

30m: Student Presentations 12, 13, 14 _____ / _____ / _____

wk 11: W. Nov 5:

A) 60m: Lecture: Natural History before Darwin

B) 30m: Read and Discuss: Baigrie, *SR*, 151-156; 209-225, 239-246, (Extra Credit: 251-165, 285-322) and Hankins, Chp 5: pp. 113-157

1.15h: Student Presentations 15, 16, 17 _____ / _____ / _____

18, 19, 20 _____ / _____ / _____

21 _____

wk 12: W. Nov 12:

A) 60m: Lecture: The Experience of Experiment in the Biological and Physical Sciences

B) 45m: Read and Discuss: Baigrie, *SR*, 115-132, 157-174, 195-208; Hankins, Chp. 3: pp.46-80; and Shapin, Chp. 2, pp. 65-114.

45m: Student Presentations 22, 23, _____ / _____

24, 25 _____ / _____

wk 13 W. Nov 19:

A) 60m: Go over exam format; Read and Discuss: Jonathan Swift, *Gulliver’s Travels*; and Shapin, Chp 3, 119-165.

B) 1.30m: Student Presentations 26, 27, 28 _____ / _____ / _____

29, 30, 31 _____
/ _____ / _____

32, 33 _____ / _____

wk 14 W. Nov. 26: * * * 1.5 Hour Exam (Objective section only) * * *

HAPPY THANKSGIVING!

wk 15: W. Dec 3:

Student Presentations 34, 35, 36 _____ / _____ / _____

37, 38, 39 _____ / _____ / _____

40, 41, 42 _____ / _____ / _____

43 _____

R. Dec. 11: * WRITTEN PRESENTATION ESSAY / LESSON PLAN DUE (AS FINAL) *

Hard copy must be turned into my GA at my office door, between: _____ (time tba)

Instructor's Policies and Class Philosophy

Please inform the professor *in advance* (via phone / voice mail x2071 or utd email) of any possible absences or situations that may keep you from submitting assignments on time. I'll try to help in any way I can. Late assignments will not be accepted nor absences excused without such prior notice. Because attendance and participation count as a substantial part of your grade in this course, unexcused absences, tardy arrivals, early departures will count against this portion of your grade.

In accordance with university policy and my personal and professional values, this is a drug-free, alcohol-free, smoke-free, barrier-free classroom. In the interests of promoting a comfortable learning environment, all students and the professor pledge to respectfully consider the expression of ideas and opinions by others regardless of political, philosophical, religious, intellectual, cultural, racial, generational or gender differences.

Any student found guilty of plagiarism (using another person's thoughts, words, ideas, terminology etc. without properly acknowledging them with footnotes, endnotes, or parenthetically in the text with a bibliography will be subject to disciplinary action under the policies of the University of Texas-Dallas. See the university's student code, MLA style sheet or Chicago Manual of Style for more information.

In accordance with university policy, this is a drug-free, alcohol-free, smoke-free, barrier-free classroom. In the interests of promoting a comfortable learning environment, all students and the professor pledge to respectfully consider the expression of ideas and opinions by others regardless of political, philosophical, religious, intellectual, cultural, racial, generational or gender differences.

All descriptions and timelines are subject to change at the discretion of the Professor.

Students are responsible for listening for in-class announcements/changes and checking WebCT for additional messages or postings.

UTD POLICY STATEMENTS

Field Trip Policies: no field trips scheduled or required

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called “the respondent”). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent’s School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean’s decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester’s end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:

The University of Texas at Dallas, SU 22
PO Box 830688
Richardson, Texas 75083-0688
(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student’s responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

Off-Campus Instruction and Course Activities

Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website

address given below. Additional information is available from the office of the school dean.
(http://www.utdallas.edu/BusinessAffairs/Travel_Risk_Activities.htm)

ENRICHMENT BOOK LIST
BACKGROUND AND IDEAS for PAPERS and PRESENTATIONS
FOR
HUHI 7368 and HIST 3328
FALL 2008

History of Ancient and Medieval Science and Medicine

1. Lindberg, David The Beginnings of Western Science (relevant chapters)
2. Hamburger, Jean. Diary of William Harvey (fictionalized diary) Rutgers University Press; (October 1992) **ASIN:** 0813518253
3. Porter, Roy, The Greatest Benefit to Mankind: A Medical History of Humanity (relevant chapters)
4. Miller, Andrew. Ingenious Pain (novel)
5. Ulrich, Laurel, A Midwife's Tale. Vintage; Reprint edition (June 4, 1991) **ISBN:** 0679733760
6. Lewis, C.S. The Discarded Image

Sci Rev / Copernicus

1. Banville, John, Doctor Copernicus (biographical novel)
2. Dear, Peter, Revolutionizing the Sciences : European Knowledge and Its Ambitions, 1500-1700. Princeton Univ Pr; (April 1, 2001) **ISBN:** 0691088608
3. Henry, John, The Scientific Revolution and the Origins of Modern Science (Studies in European History), Palgrave Macmillan; 2nd edition (January 2002) **ISBN:** 0333960904
4. Westfall, Richard. The Construction of Modern Science
5. Jardine, Lisa. Ingenious Pursuits: Building the Scientific Revolution.
6. Biagioli, Galileo, Courtier
7. Moss, J.D. Novelties in the Heavens: Rhetoric of Science and the Copernican Controversy
8. Hallyn, Fernand, Poetic Structure of the World
9. Ferris, Timothy, Coming of Age in the Milky Way

Tycho, Galileo, Kepler

1. Ferguson, Kitty, Tycho and Kepler, Walker & Co; (November 2002) **ISBN:** 0802713904
2. Banville, John, Kepler (biographical novel)
3. Sobel, Dava. Galileo's Daughter (hybrid fictional/diary); Penguin USA (Paper); (October 31, 20 00) **ISBN:** 0140280553
4. Voelkel, James, Johannes Kepler and the New Astronomy
5. Biagioli, Galileo, Courtier

Sci and Religion

1. William Shea, Galileo in Rome: the Rise and Fall of a Troublesome Genius, Oxford University Press; (September 2003) **ISBN:** 019516598
2. James A. Connor, Kepler's Witch : An Astronomer's Discovery of Cosmic Order Amid Religious War, Political Intrigue, and the Heresy Trial of His Mother; Harper San Francisco; (March 30, 2004) **ISBN:** 0060522550
3. Lindberg, David. God and Nature (relevant chapters)
4. Westfall, Richard, Science and Religion in the 17th c.
5. Brookes, John. Science and Religion
Newton

1. Westfall, Richard, Never at Rest: A Biography of Isaac Newton; Cambridge University Press; (April 1983) **ISBN: 0521274354**
2. Westfall, Richard, Newton. The Life of Isaac Newton: Abridged. Cambridge University Press; Reprint edition (July 29, 1994) **ISBN: 0521477379**
3. Dobbs, Betty Jo Teeter, Newton and the Culture of Newtonianism. Humanity Books; (February 1995) **ASIN: 1573925470**

Women and “Science”

1. Merchant, Carolyn, The Death of Nature: Women, Ecology and the Scientific Revolution. Harper SanFrancisco; Reprint edition (January 10, 1990) **ISBN: 0062505955**
2. Schiebinger, Londa, The Mind Has No Sex? Harvard Univ Pr; Reprint edition (March 1991) **ISBN: 067457625X**
3. Shteir, Ann and Gates, Barbara. Natural Eloquence: Women Reinscribe Science; University of Wisconsin Press; (June 1997) **ISBN: 029915484X**
4. Whitaker, Katie, Mad Madge: The Extraordinary Life of Margaret, Duchess of Newcastle, the First Woman to Live by Her Pen, Basic Books; (September 2002) **ISBN: 046509161X**
5. Todd, Janet. The Secret Life of Aphra Behn, Rutgers University Press; (September 1997) **ISBN: 0813524555**

Experimental Science

1. Shapin and Schaffer, Leviathan and the Air Pump, Princeton Univ Pr; Reprint edition (October 1989) **ISBN: 0691024324**
2. Heilbron, J.L. Electricity in the 17th and 18th Century: A Study of Early Modern Physics, University of California Press; (June 1979) **ASIN: 0520034783**
3. Latour, Bruno. Laboratory Life, Princeton Univ Pr; Reprint edition (September 1, 1986) **ISBN: 069102832X**

Literature of Science

1. Behn, Aphra, Emperor of the Moon (play, comedy/satire)
2. Shadwell, The Virtuoso (play, comedy/satire)
3. Jonson, Ben. The Alchemist (play, comedy/satire)
4. Cavendish, Margaret, New Blazing World (prose medley, imag'y voyage)
5. Pope, Alexander Essay on Man and the Dunciad (poetic essay/ mock heroic poem)
6. Milton, Paradise Lost (classic Christian epic poem)
7. Nicolson, Marjorie, Science and Imagination
8. Eco, Umberto. Island of the Day Before (experimental novel, late 20th c.)
9. Stephenson, Neil. Quicksilver (experimental novel, early 21st c.)