

History of Science 201 | The Origins of Scientific Thought
Integrated Liberal Studies 201 | Western Culture: Science, Technology, and Philosophy

University of Wisconsin-Madison

Fall 2018: TTh 12:00–12:50PM

Social Sciences 6210

instructor Professor Florence Hsia
 4123 Mosse Humanities Building
 office hours: 9:00 am–11:00 am Friday & by appt.
 263-1783 | florence.hsia@wisc.edu

teaching assistants
 Hist Sci: James Barnes (james.barnes@wisc.edu)
 ILS: Duygu Eriten (findik@wisc.edu)
 ILS: Paul Stein (psstein@wisc.edu)

COURSE SUMMARY

What does science have to do with religion? What does it mean to have expertise about the natural world? And what difference do politics and funding sources make to scientific investigation? Learn how to think critically and historically about science in this course by exploring such fundamental questions across two millennia. We begin with ancient mythology and philosophy, then follow the movement of the Greek classical tradition into medieval Islam and Christendom, and finally turn to the ‘revolution’ in science of the 16th and 17th centuries with Copernicus, Galileo, Descartes, and Newton. These historical investigations provide vital insights into ideas of the ‘natural’, scientific observation, and experiment, as well as into our expectations of scientific knowledge and the scientific enterprise.

This course meets for three 50-minute class periods each week over the fall semester. You can expect to work on course learning activities for about 2 hours outside of class for every class period. Plan to give an average of 6 hours per week to reading, writing, preparing for discussions, and/or studying for quizzes and exams for this course. To make the most of your time in class, complete the readings assigned for each class meeting before coming to class. Bring the readings with you to all lectures and discussion sections.

On successfully completing this course, you should be able to

- explain some critical developments in how the natural world has been analyzed and understood
- recognize how science and its history have served a wide range of purposes
- understand how science has been deeply shaped by its historical and cultural contexts
- interpret historical sources to construct persuasive arguments concerning science and its history

COURSE REQUIREMENTS & ASSESSMENT

1. Attend lectures and discussion sections.
2. Prepare readings for the day they are assigned.
3. Grades will be based on attendance and class participation in discussion sections; assignments, quizzes, or other exercises in discussion sections; and three exams. Grades will be calculated using the following rough guidelines:

attendance & class participation in discussion sections	~10%
assignments/quizzes/exercises in discussion sections	~20%
exam 1 (in class, Tuesday, October 9)	~20%
exam 2 (in class, Thursday, November 8)	~20%
exam 3 (take-home due Wednesday, December 19 by 10:00 am)	~30%

COURSE POLICIES

- I will make every effort to honor requests for reasonable instructional accommodations made by persons with disabilities. If you think you may qualify for accommodation, please contact the McBurney Disability Resource Center at 263-2741 or <http://mcburney.wisc.edu/students/howto.php> to establish your eligibility for services. If you need such accommodation, please let me know as soon as possible in the semester. All requests are confidential.
- If you need to reschedule an exam due to a religious observance, please let me know within the first two weeks of class. If you must miss an exam in the course of the semester due to other unavoidable circumstances (such as a medical problem, family emergency, or university-approved athletic trip) you should notify me and your TA—preferably in advance—so that we can make arrangements for you to take a makeup exam within a week of the originally scheduled date. If you miss an exam and do not contact me about a makeup exam by the following day, you will not be able to take a makeup exam.
- Academic integrity is expected of students at the University of Wisconsin-Madison in compliance with state law (UWS Chapter 14). Plagiarism and other forms of academic misconduct carry penalties. All written work that you turn in under your name should be solely your work. All sources must be acknowledged. It is your responsibility to understand what counts as academic misconduct. The University's policy is outlined here: <https://conduct.students.wisc.edu/academic-integrity/>. Consult the Writing Center's guide to quoting sources: <http://writing.wisc.edu/Handbook/QuotingSources.html>.

TEXTBOOKS

All course readings are available via Canvas except for assignments in the following textbooks, which may be purchased at the University Book Store or consulted at College Library, Helen C. White Hall. The Dear textbook can also be read as an e-book through the UW–Madison Library Catalog.

- David C. **Lindberg (L)**, *The beginnings of Western science* (University of Chicago Press, 2nd edition, 2007)
- Peter **Dear (D)**, *Revolutionizing the sciences* (Princeton University Press, 2nd edition, 2009)

SCHEDULE OF READINGS

Unit 1: Scientific Traditions

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| Sept 6 (Th) | <u>course introduction; ancient world views</u>
Canvas: Homer, <i>The Odyssey</i> ; Milesians
Lindberg (L) , pp. 1–3, 21–29 |
| Sept 11 (T) | <u>Greek medicine</u>
healing cults; 'The sacred disease'
L, pp. 111–19 |
| Sept 13 | <u>Greek natural philosophy</u>
Eleatics, pluralists, & atomists
L, pp. 29–34 |
| Sept 18 | <u>Plato</u>
Plato, <i>Republic</i> and <i>Timaeus</i>
L, pp. 34–44 |
| Sept 20 | <u>Aristotle</u>
Aristotle, <i>Physics</i>
L, pp. 45–52 |

- Sept 25 Aristotle continued
Aristotle, *Physics*
L, pp. 52–66
- Sept 27 Greek cosmology
daily phenomena; Ptolemy, *Almagest*
L, pp. 41–43, 86–87
- Oct 2 Greek astronomy
planetary phenomena; Ptolemy's planetary models
L, pp. 12–17, 88–105 (diagrams at pp. 100–104, figs. 5.10–5.15)
- Oct 4 (Th) *The Matrix* (1999)
Irwin, "Computers, caves, and oracles: Neo and Socrates" (2002)
- Oct 9 (T) EXAM 1 in class**
- Unit 2: Renaissance & Revolution*
- Oct 11 Greek learning and the Christian Middle Ages
Abelard, Anselm, and Bernard of Clairvaux
Aristotle and the University of Paris
L, pp. 203–33, 243–53
- Oct 16 scientific renaissance
Mondino de' Luzzi, *Anatomy* (1316/1493); Vesalius, *On the fabric of the human body* (1543)
L, pp. 119–31
Dear (D), chap. 2, section III (pp. 36–40)
- Oct 18 scientific renaissance continued
Peurbach, *New theoricis of the planets* (c.1474)
Sacrobosco, *Sphere* (1482)
L, pp. 261–70
D, intro, section III (pp. 7–9); chap. 1, sections I–III (pp. 10–23); chap. 2, sections I–II (pp. 29–32)
- Oct 23 heliocentrism
Copernicus, *On the revolutions* (1543)
D, chap. 2, section II (pp. 32–36)
- Oct 25 responses to heliocentrism
Copernicus, *On the revolutions* (1543)
Brahe, *Instruments* (1602); *On the most recent phenomena* (1588/1610)
D, chap. 2, section IV (pp. 40–43) and chap. 6, section I (pp. 99–101)
- Oct 30 heliocentrism
Kepler, *Cosmographical mystery* (1596); *Rudolphine tables* (1627)
Harriot sketches (1609); Fontana, *New observations* (1646)
Galileo, *Sidereal messenger* (1610)
D, chap. 4, sections I–III (pp. 64–77) + chap. 6, section II (pp. 101–106)
- Nov 1 heliocentrism continued
Oct 30 reading assignments

- Nov 6 the Galileo affair
Castelli-Galileo (1613), Bellarmine-Foscarini (1615) letters
Inquisition & Index documents (1616); Vatican letters (1631)
Galileo, *Dialogue on the two chief world systems* (1632)
- Nov 8 (Th) EXAM 2 in class**
- Unit 3: New Worlds*
- Nov 13 the skeptical crisis
Descartes, *Discourse on the method* (1637); Vespucci illustrations
Of two woonderful Popish monsters (1586)
Paré, *On monsters and prodigies* (1573)
D, chap. 5, section I (pp. 79–82)
- Nov 15 Baconian experiment
Bacon, *Great instauration* (1620)
Galileo, *Dialogue on the chief two world systems* (1632)
Boyle, “New experiments,” *Philosophical transactions* (1668)
D, chap. 3, sections III–IV (pp. 55–63); chap. 7, sections I and IV (pp. 127–30, 137–44)
- Nov 20 scientific communities
Philosophical transactions exercise
Philosophical transactions 1 (1665): 1–16 & Oldenburg, “To the Royal Society”
- Nov 22 (Th) Thanksgiving
- Nov 27 mechanical philosophies
Descartes, *Principles of philosophy* (1644/1647)
D, chap. 5, sections I–II (pp. 79–85)
- Nov 29 the Cartesian world
Fontenelle, *Conversations on the plurality of worlds* (1686)
D, chap. 5, sections III–VI (pp. 85–98)
- Dec 4 the Newtonian world
Newton, “The system of the world” (1685); *Mathematical principles* (1687/1729)
Newton, *Opticks* (1706/1717), “Query 31”
D, chap. 8, sections I–III (pp. 145–63)
- Dec 6 scientific societies
Bacon, *New Atlantis* (1627)
D, chap. 6, section IV (pp. 109–20)
- Dec 11 science & society
Swift, *Gulliver’s travels* (1726/1727)
D, chap. 6, section V (pp. 120–26) and conclusion (pp. 164–66)
- Dec 19 (W) EXAM 3 due Wednesday, December 19 by 10:00 am**