

History of Science 201: The Origins of Scientific Thought
and
Integrated Liberal Studies 201: Western Culture: Science, Philosophy, and Technology I
Spring 2007

Professor Michael Shank
Teaching Assistants: David Meshoulam, Scott Trigg
Dept of History of Science and Program in Integrated Liberal Studies

Two lectures: Tuesday-Thursday 11-12:15 in 19 Ingraham Hall.

One weekly discussion section (T or W)

Office hours: Shank W 2-3:30 in 7135 Social Science (262-3972) mhshank@wisc.edu

History of Science 201: Meshoulam TBA (7142 Social Science) daveedmesh@gmail.com

ILS 201: Trigg W 12-1 (Rm 302 Meiklejohn/ILS House @Charter and Johnson)
strigg@wisc.edu

This is the first course in a sequence of introductory courses that treat scientific, technological, and related developments from antiquity through the twentieth century. ILS/HS 201 begins with early technology and Babylonian astronomy, and moves into classical Greece and the two traditions fertilized by Greek mathematics, medicine, and natural philosophy (i.e., the civilizations of medieval Islam and Latin Christendom). It concludes with the Scientific Revolution in early modern Europe, culminating in Newton's unification of physics and astronomy. As we will see, many of these developments are intimately intertwined with the histories of philosophy, religion, and institutions. (ILS/HS 202 covers Newton to the 20th c.)

Course requirements and grading

Attend lectures and sections; participate in discussions.

The reading load is sometimes demanding but falls well within the "2 hours outside of class for every hour in class" formula. As much as possible, read in advance of lecture (**and always in advance of section**). Keep up with the reading and take notes!

Section work: 30% (the TAs will discuss the breakdown)

Two one-hour exams (in class) (2/27 and 3/29): 20% each;

Final exam 30%.

The exams will consist of several short "identification/explanation essays" and one longer essay/argument, all chosen from among several options selected from a pre-circulated review sheet.

Books (on order at University Bookstore; only Lindberg at Underground Textbooks)

David Lindberg, The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious and Institutional Context, 600 B. C. to A. D. 1450 (Chicago: University of Chicago Press, 1992).

Michael R. Matthews, ed., The Scientific Background to Modern Philosophy (Hackett, 1989).

Paolo Rossi, The Birth of Modern Science (Malden, Mass.: Blackwell, 2000).

The photocopied course reader is on sale at the History of Science Dept Office (7143 Social Science Building) for \$14 (cash or check payable to History of Science Dept) between 8 a.m. and 5 p.m. **NOTE: It is non-refundable.** The reader is also on reserve at the College Library (Helen C. White Hall).

Honors projects: Many types of projects are suitable for honors work, from hands-on projects (e.g., building a small telescope, programming a graphic visual aid, etc) through the completion of a reading list/review cum conversation with me, to a traditional essay or research paper. I strongly encourage honors students to discuss their plans and wishes with me **well before the first hour exam.**

Additional expectations: 1) **Academic honesty:** all work submitted under your name must be your own. For violators, I seek the harshest penalties available. 2) **Notification of absences:** please notify the instructor and your TA **well in advance** of any anticipated absences (religious observances, etc) and ASAP in case of emergency.

Part 1: Antiquity: From the Ancient Near East to Greece

Week 1: Where to begin?

T 1/23: Ancient Near-Eastern technologies; myth; Babylonian mathematics & astronomy

Th 1/25: The Emergence of "Nature"/Naturalism: the Pre-Socratic Philosophers

Lindberg, Beginnings, ch. 1; *M. Clagett, "Science in Egypt and Mesopotamia," ch. 1 of Greek Science in Antiquity, pp. 3-20; *Thales, Anaximander, Anaximenes, Parmenides excerpts from K. Freeman, Ancilla to the Pre-Socratic Philosophers (Cambridge, Mass.: Harvard UP, 1957), 18-19, 41-46.

Week 2: The Teacher and the Student: Plato and Aristotle (

T 1/30: Plato's Two Worlds and their consequences for knowledge of nature

Th 2/1: Aristotle's solution to the problem of change and his natural philosophy

Lindberg, ch. 2-3; *Plato, selections from the Republic VII ("Myth of the Cave") and the Timaeus (Reader, pp. 19-29); Aristotle selections in Matthews, pp. 5-32.

Week 3: Greek Mathematics and Astronomy

T 2/6 From the early Pythagoreans to Euclid and Archimedes

Th 2/8: From Eudoxus to Ptolemy

Lindberg, ch. 5; *"Incommensurables," from Cohen and Drabkin, eds., Source Book in Greek Science (Cambridge: Harvard UP, 1948), pp. 13-14; *Euclid, Elements, definitions, postulates, common notions; Bk 1, Prop. 1; *Ptolemy, Almagest, Book I, (trans. G. J. Toomer) (New York: Springer, 1980), pp. 1-9 (Reader pp. 30-42).

Week 4:

T 2/13 Greek Medicine: Hippocrates to Galen

Th 2/15 Technology in Greco-Roman Antiquity

Lindberg, ch. 6; *[Pseudo-]Hippocrates, "The Sacred Disease" from Lloyd, ed., Hippocratic Writings (London: Penguin), pp. 237-51 (Reader, pp. 43-50).

Week 5: From Rome to Baghdad

T 2/20 The Puzzle of Rome

Th 2/22 Emergence of Islamic Civilization (622 and all that)

Lindberg, ch. 7.

Part 2: Medieval Islam and Christendom

Week 6: Arabic Science

T 2/27 **HOURLY EXAM**

Th 3/1 From Baghdad to Spain

Lindberg, ch. 8; *al-Kindi, Introduction to Ptolemy's Almagest, in Franz Rosenthal, The Classical Heritage in Islam (New York: Routledge, 1975), pp. 216-223 (Reader, pp. 83-86).

Week 7: Emergence of Latin Medieval civilization

T 3/6 Post-colonial Europe: Medieval agriculture

Th 3/8 The rise of the universities

Lindberg, ch. 9-10; *Jean Gimpel. "The Agricultural Revolution," ch. 2 of his The Medieval Machine (New York, 1976), pp. 29-58; *The Condemnations of 1277" in E. Grant, A Sourcebook of Medieval Science (Cambridge: Harvard University Press, 1974), pp. 45-50 (Reader, pp. 53-74).

Week 8: The Scientific Enterprise in the Latin Middle Ages

T 3/13 The changing character of natural philosophy

Th 3/15 Life Sciences

Lindberg, ch. 11-13; *"Twelfth-Century Bestiary," in E. Grant, A Sourcebook of Medieval Science (Cambridge: Harvard University Press, 1974), pp. 644-51; *Kenneth Kitchell and Irvén Resnick, "Hildegard as a Medieval 'Zoologist': The Animals of the Physical in Maud Burnett McNerny, ed., Hildegard of Bingen: A Book of Essays (New York: Garland, 1999), pp. 25-33 (skim rest); *The Art of Falconry, being the De arte venandi of Frederick II, trans. C. A. Wood and F. M. Fyfe (Stanford University Press, 1943), pp. 5-10, 39-40, 49-52, 78-79; *"John Buridan..." in Marshall Clagett, The Science of Mechanics in the Middle Ages (Madison: University of Wisconsin Press, 1959), pp. 557-664 (Reader, pp. 87-105, 117-122; skim 106-115).

Week 9: Old Worlds and New

T 3/20: Technologies of time and writing (13-15th c.)

Th 3/22: Aristotelianism, Platonism, and naturalism in the Renaissance

Lindberg, ch. 14; Rossi, ch. 1-4; *Paul O. Kristeller, "The Aristotelian Tradition," in his Renaissance Thought and its Sources (New York: Columbia University Press, 1979), pp. 32-49; Marsilio Ficino, Three Books on Life, Bk I, ch. vii-x; Dürer's "Melencolia I" (Reader, pp. 123-139).

Week 10: Early Modern Anatomy and Physiology

T 3/27: From Vesalius to Harvey: anatomy and physiology

Th 3/29: **HOURLY EXAM**

Rossi, ch 12; *William Harvey, excerpts from On the Movement of the Heart and Blood (1628) trans. K. J. Franklin (Oxford: Blackwell, 1963) pp. 3-4, 23-29, 57-66.

March 31-April 8: Spring Break

Week 11: Changing cosmological models

T 4/10 From Regiomontanus to Copernicus and Tycho Brahe

Th 4/12 Kepler's Revolution in Astronomy

Rossi, ch 5; Copernicus selections (Commentariolus and De Revolutionibus) in Matthews, pp. 33-44

Week 12 Galileo Galilei (d. 1642)

T 4/17: Galileo on motion and the telescope

Th 4/19: Galileo's Dialogue (1632) and its aftermath

Rossi, ch. 6; Matthews, pp. 53-86; *Galileo, original manuscripts and drawing for Sidereus Nuncius and "Letter to the Grand Duchess Christina," from S. Drake, ed., Discoveries and Opinions of Galileo; *I. B. Cohen, "Towards an Inertial Physics," ch. 5 of his The Birth of a New Physics (New York: Norton, 1985), pp. 81-126 (Reader, pp. 153-192).

Week 13 Methods and Scientific Visions: Francis Bacon and René Descartes

T 4/24: F. Bacon (d. 1627) and the Baconian Program

Th 4/26: R. Descartes (d. 1650), Cartesian rationalism, and the "mechanical philosophy"

Rossi, ch. 7-9; Bacon and Descartes in Matthews, pp. 45-52, 87-94, 99-105.

Week 14: Physics explains Astronomy

T 5/1 Newton: craft and theory

Th 5/3: The Newtonian Synthesis of physics and astronomy, mathematics and experiment

Rossi, ch. 15, 17: Newton selections in Matthews, 133-58.

Week 15: Academics and Academies

T 5/8: Universities and Scientific Societies

Th 5/10 Looking back—and forward

Rossi, ch. 16; Michael Hunter, "The Significance of the Royal Society, ch. 2 of his Science and Society in Restoration England (Cambridge University Press, 1981), pp. 32-59 (Reader, pp. 193-203)

Final Exam: May 16 at 12:25 p.m. (always doublecheck the time and especially the place in the timetable)