

History of Science 201: The Origins of Scientific Thought
Integrated Liberal Studies 201: Western Culture: Science, Philosophy, and Technology I
Spring 2009

Professor Michael H. Shank

Teaching Assistants: Scott Prinster (ILS), Scott Trigg (History of Science)

Two lectures: Tuesday-Thursday 9:30-10:45 in 5208 Social Science.

One weekly discussion section

Office hours:

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

HistSci 201: Scott Trigg (sgrigg@wisc.edu): W 2:15-3:45 in 7142 Social Science

ILS 201: Scott Prinster (sprinster@wisc.edu): TTh 11-12 in 303 Meiklejohn House

This is the first in a sequence of introductory courses that treat primarily scientific (but also related technological and medical) developments from antiquity through the twentieth century. ILS/HistSci 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 intertwined with the histories of philosophy, religion, and institutions. (ILS/HistSci 202 covers Newton to the 20th c.)

Course requirements and grading

Attendance at lectures and sections; active participation in section 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!

Working in conjunction with the McBurney Center, the course staff will make every effort to accommodate students with disabilities.

Section work: 30% (your TA will discuss the breakdown).

Two one-hour exams (in class) (2/12 and 4/2): 20% each.

Final exam 30%.

The exams will typically consist of several short "identification/explanation essays" and one longer essay/argument, all chosen from several options drawn from pre-circulated review sheets.

Books

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, 2007); **second edition (red-orange cover)**

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: This reader is non-refundable.**

The reader and books are 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 followed by an in-depth conversation with me, to a traditional essay or research paper. I strongly encourage honors students to take some initiative, and to discuss their plans and wishes with me early on, by week 4 at the latest

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 (including 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 1/20: Ancient Near-Eastern technologies; myth; Babylonian mathematics & astronomy

Th 1/22: 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 1/27: Plato's Two Worlds and their consequences for knowledge of nature

Th 1/29: Aristotle's natural philosophy and solution to the problem of change

Lindberg, ch. 2-3; *Plato, selections from the Republic VII ("Myth of the Cave") and the Timaeus; Aristotle, Physics, selections in Matthews, pp. 5-26.

Week 3: Greek mathematics and astronomy

T 2/3 From the early Pythagoreans to Euclid and Archimedes

Th 2/5: 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.

Week 4: Medicine and technology in Greco-Roman antiquity

T 2/10 Greek Medicine: Hippocrates to Galen

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

Th 2/12 **HOURLY EXAM**

Week 5: From Rome to Baghdad

- T 2/17 Technology in Greco-Roman Antiquity
 Lindberg, ch. 7
 Th 2/19 The Puzzle of Rome

Part 2: Medieval Islam and Christendom

Week 6: Arabic science

- T 2/24 Emergence of Islamic Civilization (622 and all that)
 Th 2/26 From Baghdad to Spain
 Lindberg, ch. 8; *al-Kindi, Intro to Ptolemy's Almagest, in Franz Rosenthal, The Classical Heritage in Islam (New York: Routledge, 1975), pp. 216-223.

Week 7: Emergence of Latin medieval civilization

- T 3/3 Post-colonial Europe: Medieval agriculture
 Th 3/5 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, ed., Sourcebook of Medieval Science (Cambridge: Harvard UP, 1974), pp. 45-50.

Week 8: The scientific enterprise in the Latin Middle Ages

- T 3/10 The changing character of natural philosophy
 Th 3/12 Life sciences
 Lindberg, ch. 11-13; *"Twelfth-Century Bestiary," in E. Grant, A Sourcebook of Medieval Science (Cambridge: Harvard UP, 1974), pp. 644-51; *Kenneth Kitchell and Irvn Resnick, "Hildegard as a Medieval 'Zoologist:' The Animals of the Physica," 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 UP, 1943), pp. 5-10, 39-40, 49-52, 78-79; *"John Buridan..." in Marshall Clagett, The Science of Mechanics in the Middle Ages (Madison: U. Wisconsin Press, 1959), pp. 557-64.

March 14-22: Spring Break**Week 9: Old worlds and new**

- T 3/24: Technologies of time and writing (13-15th c.)
 Th 3/26: 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 UP, 1979), pp. 32-49; Marsilio Ficino, Three Books on Life, Bk I, ch. vii-x; Dürer's "Melencolia I".

Week 10: Early modern anatomy and physiology

- T 3/31: From Vesalius to Harvey: anatomy and physiology
 Th 4/2: **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.

Week 11: Changing cosmological models

T 4/7 From Regiomontanus to Copernicus and Tycho Brahe

Th 4/9 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 4/14: Galileo on motion and the telescope

Th 4/16: 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.

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

T 4/21: F. Bacon (d. 1627) and the Baconian Program

Th 4/23: 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 4/28 Newton: craft and theory

Th 4/30: 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 5/5: Universities and Scientific Societies

Th 5/7 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.

Final Exam: Wednesday May 13 at 2:45 p.m. (double-check the time and especially the place, TBA)