

History of Science 322/Medieval Studies 322/History of Science 622
Ancient and Medieval Science (Spring 2004)

Michael H. Shank

Office hours: Wed. 2:00-3:30 (Social Science 7135) or by appointment (262-3972; email: mhshank@wisc.edu)

Lectures: 8:50 MW in Social Science 4308,
Undergrad Discussion: F in Social Science 4308
Graduate students taking HS/MS 322 must be enrolled concurrently in HS 622
(Discussion tentatively set for Friday 11 in Social Science 6304).

The following required books were ordered at Underground Textbooks and University Bookstore:

Plato, Timaeus, trans. Peter Kalkavage (Newburyport, Mass.: Focus, 2001).

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) [=BWS below].

Michael H. Shank, ed., The Scientific Enterprise in Antiquity and the Middle Ages (Chicago: University of Chicago Press, 2000).

Richard Dales, ed., The Scientific Achievement of the Middle Ages (Philadelphia: University of Pennsylvania Press, 1973).

Grad students: G. E. R. Lloyd, The Ambitions of Curiosity (Cambridge University Press, 2002).

Additional readings--articles and excerpts marked by an asterisk* below--are distributed in photocopy at a cost of \$16 (322) and \$10 (622)—a bargain at 5 cents a page. They are available in the History of Science Dept (Social Science 7143). Cash, or checks payable to "History of Science Dept."

Requirements

General: attendance at two lectures per week; participation in the Friday discussion; completing the readings in timely fashion (the undergraduate reading load averages about 85 pages per week, with some weeks lighter than others. Note that a short reading is not necessarily an easy reading; for this course, you should plan on spending a good 2 hours outside of class for every hour in class.

Undergraduates: an hour midterm essay exam (25%), two 4-page article analyses (20%), one final synthetic essay exam (30%) with an in-class short essay (15%); participation in discussion (10%). Extra credit analyses or projects by special permission.

Graduate students: concurrent enrolment in HS 622 (11 am in 6304 Social Science); attendance at lectures; participation in 622 discussions (20%); two detailed reviews (5-8 pages) of two books relevant to the course and totaling 500 pages (or the equivalent) (20% each); oral report on one review (10%); one take-home, 8-10-

page final essay (35%). The readings listed under "Grad supplement" are to be completed in time for discussion on the following Monday).

Note that I have no tolerance for plagiarism or any other form of academic dishonesty, including the purchase or the resubmission of papers. All submitted work for this course must start as your work, develop as your work, and be your work when submitted. The phrases of others must be in quotation marks; their ideas must be credited. When I have found academic dishonesty, I have sought the harshest sanctions available, including expulsion of the guilty from the university without a degree.

Important dates

Midterm exam: March 8 (if in-class option)
 Grads: review reports on March 18 and April 12
 Target date for all written work: May 3
 Final deadline for all regular written work: Friday May 10 at 5 p.m..
 Final exam (in-class portion): May 12 at 7:45 a.m..

Course Schedule

Week 1: Where to begin?

W 1/21 Introduction: "Science" in Antiquity as a Problem and a Hot Topic
 F 1/23 Egypt and Mesopotamia (lecture, not discussion)

Lindberg, Beginnings, ch. 1; *M. Clagett, "Science in Egypt and Mesopotamia," in Greek Science in Antiquity (Macmillan, 1955), pp. 3-20; O. Neugebauer, "The Study of Wretched Subjects;" D. Pingree, "Hellenophilia and the History of Science," and Martin Bernal, "Animadversions on the Origins of Ancient Science,"--all in Shank, Scientific Enterprise, pp. 21, 30-39, 72-83.

Grad supplement: *Jack Goody and Ian Watt, "The Consequences of Literacy," in Goody, ed., Literacy in Traditional Societies, pp. 27-68; H. von Staden, "Affinities and Elisions: Helen and Hellenocentrism" and Shank, "Introduction," in Shank, Scientific Enterprise, pp. 1-19, 54-71.

Week 2: Parmenides and Plato

M 1/26 The Ionian natural philosophers
 W 1/28 The challenge of Parmenides/ Plato
 F 1/30 Discussion: Excerpts from Ionians /Plato's Timaeus

Lindberg, BWS, ch. 2; *Thales, Anaximander, Anaximenes, Parmenides from K. Freeman, Ancilla to the Presocratic Philosophers (Harvard UP, 1957), 18-19, 41-46; *B. Farrington, "The Character of Early Greek Science," from Farrington, Head and Hand in Ancient Greece (London: Watts, 1947) *Jean-Pierre Vernant, "The New Image of the World," The Origins of Greek Thought (Ithaca: Cornell UP, 1968); Plato, Timaeus [read #17-#46 middle]=pp. 47-77; skim 52D-57D, 90A-92C, pp. 84-90, 126-130 in Focus edition of the Kalkavage translation.

Grad supplement: *A. A. Long, "The Principles of Parmenides's Cosmology," *G. Vlastos, "Theology and Philosophy in Early Greek Thought," in Furley and Allen, eds., Studies in Presocratic Philosophy, vol. 1. (New York: Humanities Press, 1970), pp. 92-129.

Week 3: Aristotle

M 2/2 Logic, Method, Biology

W 2/4 The Problem of Change

F 2/6 Discussion: Aristotle readings and Horowitz article

Lindberg, BWS, ch. 3; *Marjorie Grene, "On Interpreting Aristotle," A Portrait of Aristotle (Chicago); *Aristotle, Physics, book I (trans. Apostle); *excerpts from Parts of Animals, History of Animals in Cohen and Drabkin, eds., Source Book in Greek Science (Cambridge: Harvard UP, 1948); *Maryann C. Horowitz, "Aristotle and Woman," Journal of the History of Biology 9 (1976) 183-213.

Grad supplement: *W. D. Ross, "The Development of Aristotle's Thought," in Barnes, Schofield, Sorabji, eds., Articles on Aristotle: Science (London: Duckworth, 1975), pp. 1-13.

Week 4: Greek Mathematics and Proof

M 2/9 Arithmetic: Pythagorean ratios/ the discovery of irrational numbers

W 2/11 Geometry: Formal systems: Euclid to Apollonius

F 2/13 Discussion: Mathematics readings

Lindberg, BWS, ch. 4-5; *"Incommensurables," and *"Proclus on the origins of geometry," from Cohen and Drabkin, eds., Source Book in Greek Science (Cambridge: Harvard UP, 1948), pp. 13-14, 33-38.

Grad supplement: *W. Knorr, "Infinity and Continuity: The Interaction of Mathematics and Philosophy in Antiquity," in Kretzmann, ed., Infinity and Continuity in Ancient and Medieval Thought (Ithaca: Cornell UP, 1982).

Recommended: G. E. R. Lloyd, Magic, Reason, and Experience, ch. 2.

Week 5: Greek Astronomy and Cosmology

M 2/16 Athens: Plato, Eudoxus, Aristotle

W 2/18 Alexandria (Egypt): From Eratosthenes to Ptolemy

F 2/20 Discussion: Aristotle and Ptolemy selections

Review Lindberg, BWS, ch. 5; *Aristotle, excerpts from On the Heavens (De caelo) and Physics, from Cohen and Drabkin, eds., A Source Book in Greek Science (Cambridge, Mass.: Harvard University Press, 1974), pp. 200-209; *Ptolemy, Almagest, Book I, pp. 1-9 (trans. G. J. Toomer); B. Goldstein and A. Bowen, "A New View of Early Greek Astronomy," in Shank, Scientific Enterprise, pp. 85-95.

Grad supplement: A. Jones, "The Adaptation of Babylonian Methods in Greek Numerical Astronomy," in Shank, Scientific Enterprise, pp. 97-109; *D. Furley, "The Cosmological Crisis in Classical Antiquity," from his Cosmic Problems: Essay on Greek and Roman Philosophy of Nature (Cambridge: Cambridge UP, 1989) pp. 223-35.

Week 6: Greek Medicine and Biology

M 2/23 The Hippocratic corpus

W 2/25 Alexandrian and Galenic medicine

F 2/27 Discussion: "Sacred Disease" and Galen

Lindberg, BWS, ch. 6; *[Pseudo-Hippocrates], "The Sacred Disease;" *Galen, "On the sects: for beginners" (trans. Walzer and Frede); O. Temkin, "Greek Medicine as Science and Craft," in Shank, Scientific Enterprise, pp. 111-123.

Grad supplement: *G. E. R. Lloyd, "The Criticism of Magic and the Inquiry Concerning Nature," ch. 1 in his Magic, Reason and Experience, (Cambridge UP, 1979), pp. 10-58.

Week 7: Antiquity: Concluding Issues

M 3/1 The Roman Predicament: Greek Science in Decline?

W 3/3 Augustine /The Commentator Tradition

F 3/5 Midterm (if in-class) or (if take-home) discussion of Philoponus and Lindberg.

Lindberg, BWS, ch. 7; *Philoponus excerpts in Cohen and Drabkin, eds., A Source Book in Greek Science (Harvard); D. Lindberg, "Science and the Early Church," in Shank, Scientific Enterprise, pp. 125-146.

Grad supplement: *Augustine, On Christian Doctrine, bk II, ch. 19-42 (trans. Robertson), pp. 55-78.

Week 8: The Emergence of Arabic Science

M 3/8 Conclude discussion of antiquity

W 3/10 Translation and appropriation of Greek science

F 3/12 Discussion: Science in Arabic society (esp "Appropriation" article)

Lindberg, BWS, ch. 8; *A. I. Sabra, "The Appropriation and Subsequent Naturalization of Greek Science in Medieval Islam: A Preliminary Statement," History of Science 25 (1987) 223-243; *A. I. Sabra, "The Scientific Enterprise," in Bernard Lewis, ed., The World of Islam (Thames and Hudson); A. I. Sabra, "Situating Arabic Science: Locality versus Essence," in Shank, Scientific Enterprise, pp. 215-31.

Grads: undergrad readings and begin review reports

Spring Break 3/13-3/21

Week 9: Arabic Science

M 3/22 Medicine (Avicenna)

W 3/24 The Mathematical Sciences in Islam: Optics and astronomy

F 3/26 Discussion of readings, esp. Musallam and Sabra

*Avicenna, excerpts from Canon in Grant, ed., A Source Book in Medieval Science, pp. 715-20; *excerpts from Alhacen, Avicenna and Averroes, from S. Sambursky, ed., Physical Thought from the Presocratics to the Quantum Physicists: An Anthology (London: Hutchinson, 1974); *Basim Musallam, Sex and Society in Islam: Birth Control Before the Nineteenth Century (Cambridge/New York: Cambridge UP, 1983), ch. 1 and 3: Why Islam Permitted Contraception; Conception Theory in Muslim Thought, pp. 10-27, 39-59.

Grad supplement: *G. Makdisi, "Madrasa and University in the Middle Ages," Studia Islamica 32 (1970) 255-264; V. Roberts, "The Solar and Lunar Theory of Ibn ash-Shatir: A Precopernican Copernican Model" in Shank, Scientific Enterprise, pp. 233-37.

Week 10: Early Latin Europe

M 3/29 Agriculture and Medieval Technology: The Lynn White thesis

W 3/31 Intellectual Struggles

F 4/2 Discussion: White thesis

*L. White, "The Agricultural Revolution of the Early Middle Ages," from his Medieval Technology and Social Change (Oxford UP, 1958); *R. H. Hilton and P. H.

Sawyer, "Technical Determinism: The Stirrup and the Plough," Past and Present 24 (1963) 90-100; S. McCluskey, "Gregory of Tours, Monastic Timekeeping and Early Christian Attitudes to Astronomy," in Shank, Scientific Enterprise, pp. 147-61.

Grad supplement: Selections from *Isidore of Seville's Etymologiae, in Grant, Source Book in Medieval Science (Cambridge: Harvard UP, 1974); Linda Voigts, "Anglo-Saxon Plant Remedies and the Anglo Saxons," in Shank, Scientific Enterprise, pp. 163-181.

Week 11: The twelfth-century revival

M 4/5 The New Naturalism

W 4/7 Influx of Greco-Arabic Learning

F 4/9 Discussion: Dales selections/Alic

Lindberg, BWS, ch. 9; Dales, "The Twelfth Century," pp. 37-60; *M. Alic, "The Sibyl of the Rhine," from her Hypatia's Heritage (Beacon Press); *Charles Burnett, "Scientific Speculations," from Peter Dronke, ed., A History of Twelfth-Century Philosophy (Cambridge: Cambridge UP, 1988), pp. 151-76.

Grad supplement: undergrad readings, *M. D. Chenu, "Nature and Man: The Renaissance of the Twelfth Century" from his Nature, Man and Society in the Twelfth Century (Chicago: University of Chicago Press), pp. 1-48, and review reports

Week 12: The Universities Respond

M 4/12 Oxford University and Robert Grosseteste

W 4/14 Natural Philosophy and Theology at Paris

F 4/16 Discussion: Grosseteste /Condemnations/Lindberg's "Handmaiden" article.

Lindberg, BWS, ch. 10; Dales, "Grosseteste and Scientific Method," pp. 61-80; Lindberg, "Science as Handmaiden: Roger Bacon and the Patristic Tradition," in Shank, Scientific Enterprise, pp. 295-313; *Condemnations of 1277, from Grant, ed., Source Book in Medieval Science (Harvard); *Grant, "The Condemnation of 1277, God's Absolute Power, and Physical Thought in the Late Middle Ages," Viator 10 (1979) 211-243.

Grad supplement: *Edward Grant, "Science and the Medieval University," in Kittelson and Transue, eds., Rebirth, Reform and Resilience: Universities in Transition, 1300-1700 (Columbus: Ohio State University Press); *Shank, "A Female Student in Late Medieval Krakow," Signs 14 (1989) 373-80.

Week 13: Late Medieval Natural Philosophy

M 4/19 Medieval Optics

W 4/21 The Science of Motion

F 4/24 Discussion: esp. Buridan and Oresme (Dales)

Begin Lindberg, BWS, ch. 11-13, esp. 12; Dales, "Studies of the Rainbow" and "Studies of Local Motion," pp. 81-124; M. McVaugh, "Arnald of Villanova and Bradwardine's Law," in Shank, Scientific Enterprise, pp. 363-71; *Joan Cadden, "Nothing Natural is Shameful: Vestiges of a Debate about Sex and Science in a Group of Late-Medieval Manuscripts," Speculum 76 (2001), p. 66-89.

Grad supplement: Murdoch and Sylla, "The Science of Motion," in D. Lindberg, ed., Science in the Middle Ages (book in Hist. Sci. Dept library and other libraries; I want you to hold the book in your hands and leaf through it) . Reports?

Week 14: Specialized Sciences in the Late Middle Ages

M 4/26: Medicine

W 4/28: Astronomy, Astrology, and Cosmology

F 4/30 Discussion: Selections in Dales

Finish Lindberg, BWS, ch. 11-13, esp. 11, 13; Dales, "Astronomy," pp. 125-138; *Monica Green, "Women's Medical Practice and Health Care in Medieval Europe," Signs 14 (1989) 39-78; Helen Lemay, "The Stars and Human Sexuality: Some Medieval Scientific Views," Nancy Siraisi, "Taddeo Alderotti and Bartolomeo da Varignana on the Nature of Medical Learning," and Thorndike, "The True Place of Astrology in the History of Science," in Shank, Scientific Enterprise, pp. 239-255, 349-61.

Grad supplement: B. Goldstein, "Theory and Observation in Medieval Astronomy;" and P. Long, "Power, Patronage, and the Authorship of Ars: From Mechanical Know-How to Mechanical Knowledge in the Last Scribal Age," in Shank, Scientific Enterprise, pp. 205-213, 395-435.

Week 15: An Assessment of Medieval Science

M 5/3: Character of late-medieval science

W 5/5 Manuscript and print (Special Collections, Memorial Library)

F 5/7 Overview

Lindberg, BWS, ch. 14; Dales, "Conclusion," pp. 170-176; *John Murdoch, "The Analytic Character of Late Medieval Learning: Natural Philosophy Without Nature" from L. Robertson, ed., Approaches to Nature in the Middle Ages, pp. 171-213.

Grad supplement: Dales, "Fringes of Science;" Brian Copenhaver, "Did Science Have A Renaissance?" in Shank, Scientific Enterprise, pp. 373-93.

Final exam: 7:45 a.m. on Wednesday May 12 (but always double-check time and place!).