

History of Science 322/Medieval Studies 322/History of Science 622
 Ancient and Medieval Science (Spring 2002)
 9:55 MWF in Social Science 4308
 Instructor: Michael H. Shank

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

Graduate students taking HS/MS 322 must be enrolled concurrently in HS 622 (Monday at 2:25 in Social Science 6116).

The following required books are available at Underground Textbooks and University Bookstore:

Plato, Timaeus, Jowett trans. (Macmillan).

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).

Additional readings--articles and excerpts marked by an asterisk* below--are distributed in photocopy at a cost of \$ 14 (undergrads) and \$21 (grads). Checks (to "History of Science Dept") are preferred but cash (with a name) is accepted.

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, as for all courses, you should plan on spending 2-3 hours outside of class for every hour in class).

Undergraduates: one midterm essay exam (25%), one 4-page analysis of an article in the assigned readings (15%), one in-class short answer final exam (20%), one final take-home essay (30%); participation in discussion (10%). Extra credit projects with special permission.

Graduate students: concurrent enrolment in HS 622; attendance at lectures; participation in 622 discussions (15%); 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).

I do not tolerate plagiarism or other forms of academic dishonesty. When I have found them, I have sought the expulsion of the guilty.

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 1

Final deadline for all written work: Friday May 10 at noon.
Final exam (in-class portion): May 13 at 12:25.

Course Schedule

Week 1: Where to begin?

W 1/23 Introduction: "Science" in Antiquity as a Problem and a Hot Topic
F 1/25 Egypt and Mesopotamia (lecture, not discussion)

Lindberg, Beginnings, ch. 1; M. Clagett, "Science in Egypt and Mesopotamia," ch. 1 of Greek Science in Antiquity, 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," in Shank, Scientific Enterprise, pp. 21, 30-39, and 72-83.

Grad supplement (for Monday): 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. X22

Recommended: R. Palter, "Black Athena, Afrocentrism, and the History of Science," from Mary Lefkowitz et al., eds., Black Athena Revisited and M. Bernal, "Response to Robert Palter," History of Science 32 (1994), 445-468.

Week 2: Parmenides and Plato

M 1/28 The Ionian natural philosophers
W 1/30 The challenge of Parmenides/ Plato
F 2/1 Discussion: Excerpts from Ionians /Plato's Timaeus

Readings: 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; *J. P. Vernant, "The New Image of the World," The Origins of Greek Thought (Ithaca: Cornell University Press, 1968); Plato, Timaeus [#17-#46 middle]=pp. 1-28 in Macmillan edition of the Jowett translation. X26

Grad supplement: *G. Vlastos, "Theology and Philosophy in Early Greek Thought," in Furley and Allen, eds., Studies in Presocratic Philosophy, vol. 1. (Humanities Press), pp. 92-129. X19

Recommended: Edward Hussey, The Presocratics (London, 1972).

Week 3: Aristotle

M 2/4 Logic, Method, Biology
W 2/6 The Problem of Change
F 2/8 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., A Source Book in Greek Science (Harvard); *Maryann C. Horowitz, "Aristotle and Woman," Journal of the History of Biology 9 (1976) 183-213. X51

Grad supplement: *W. D. Ross, "The Development of Aristotle's Thought," in Barnes, Schofield, Sorabji, eds., Articles on Aristotle: Science (London: Duckworth,), pp. 1-13. X7

Recommended: G. E. R. Lloyd, Aristotle: The Growth and Structure of his Thought (Cambridge: Cambridge University Press, 1968); Jonathan Barnes, eds., The Cambridge Companion to Aristotle (Cambridge: Cambridge University Press, 1995); Martha Nussbaum, "Aristotle, Feminism, and Needs for Functioning" in Cynthia A. Freeland, ed., Feminist Interpretations of Aristotle (University Park: University of Pennsylvania Press, 1998).

Week 4: Greek Mathematics and Proof

M 2/11 Arithmetic: Pythagorean ratios/ the discovery of irrational numbers

W 2/13 Geometry: Formal systems: Euclid to Apollonius

F 2/15 Discussion: Mathematics readings

Lindberg, BWS, ch. 4-5; *Incommensurables," and "Proclus on the origins of geometry," from Cohen and Drabkin, eds., A Source Book in Greek Science (Cambridge, Mass.: Harvard University Press, 195). X5

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 University Press, 1982). X17

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

Week 5: Greek Astronomy and Cosmology

M 2/18 Athens: Plato, Eudoxus, Aristotle

W 2/20 Alexandria (Egypt): From Eratosthenes to Ptolemy

F 2/22 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); *Ptolemy, Almagest, Book I, 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. X12

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 University Press, 1989) pp. 223-35. X7

Recommended: D. R. Dicks, Early Greek Astronomy to Aristotle (Ithaca: Cornell University Press, 1970); James Evans, The History and Practice of Ancient Astronomy (Oxford: Oxford University Press, 1998).

Week 6: Biology and Medicine

M 2/25 The Hippocratic corpus

W 2/27 Alexandrian and Galenic medicine

F 2/29 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. X18

Grad supplement: *G. E. R. Lloyd, "The Criticism of Magic and the Inquiry Concerning Nature," ch. 1 in his Magic, Reason and Experience, pp. 10-58. X25

Recommended: Heinrich von Staden, Herophilus: the Art of Medicine in Early Alexandria: Edition, Translation, and Essays (Cambridge and New York: Cambridge University Press, 1989).

Week 7: Antiquity: Concluding Issues

M 3/4 The Roman Predicament: Greek Science in Decline?

W 3/6 Augustine /The Commentator Tradition

F 3/8 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. X4

Grad supplement: *Augustine, On Christian Doctrine, bk II, ch. 19-42 (trans. Robertson), pp. 55-78. X12

Week 8: The Emergence of Arabic Science

M 3/11 Conclude discussion of antiquity

W 3/13 Translation and appropriation of Greek science

F 3/15 Discussion: Science in Arabic society--marginality or centrality?

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. X23

Grads: undergrad readings and begin review reports

Week 9: Arabic Science

M 3/18 Medicine (Avicenna)

W 3/20 Optics and astronomy (Alhacen)

F 3/22 Discussion of readings, esp. Musallam and Sabra

*Avicenna, excerpts from Canon in Grant, ed., A Source Book in Medieval Science; *excerpts from Alhacen, Avicenna and Averroes, from S. Sambursky, ed., Physical Thought from the Presocratics to the Quantum Physicists: An Anthology (Hutchinson); Basim Musallam, Sex and Society in Islam: Birth Control Before the Nineteenth Century (Cambridge/New York: Cambridge University Press, 1983), ch. 1 and 3: Why Islam Permitted Contraception; Conception Theory in Muslim Thought, pp. 10-27, 39-59. X38

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. X6

Spring Break 3/23-3/31

Week 10: Early Latin Europe

M 4/1 Agriculture and Medieval Technology: The Lynn White thesis
 W 4/3 Intellectual Struggles
 F 4/5 Discussion: White thesis

*L. White, "The Agricultural Revolution of the Early Middle Ages," from his Medieval Technology and Social Change (Oxford); *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. X25

Grad supplement: Selections from Isidore of Seville's Etymologiae, in Grant, Source Book in Medieval Science (Cambridge: Harvard University Press, 1974); Linda Voigts, "Anglo-Saxon Plant Remedies and the Anglo Saxons," in Shank, Scientific Enterprise, pp. 163-181. X11

Week 11: The twelfth-century revival

M 4/8 The New Naturalism
 W 4/10 Influx of Greco-Arabic Learning
 F 4/12 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); *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). X32

Grad supplement: undergrad readings and review reports

Week 12: The Universities Respond

M 4/15 Oxford University and Robert Grosseteste
 W 4/17 Natural Philosophy and Theology at Paris
 F 4/19 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. X20

Grad supplement: *Grant, "Science and the Medieval University," in Kittelson and Transue, eds., Rebirth, Reform and Resilience: Universities in Transition, 1300-1700 (Ohio State University Press); Shank, "A Female Student in Late Medieval Krakow," Signs 14 (1989) 373-80. X22

Week 13: Late Medieval Natural Philosophy

M 4/22 Medieval Optics
 W 4/24 The Science of Motion
 F 4/26 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. X12

Grad supplement: Murdoch and Sylla, "The Science of Motion," in D. Lindberg, ed., Science in the Middle Ages (book in Hist. Sci. Dept library) . Reports?

Recommended: Nicholas Steneck, Science and Creation in the Middle Ages: Henry of Langenstein on Genesis (Notre Dame: University of Notre Dame Press, 1976).

Week 14: Specialized Sciences in the Late Middle Ages

M 4/29: Medicine

W 5/1: Astronomy, Astrology, and Cosmology

F 5/3: 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. X20

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.

Recommended: Grant, "Medieval Departures from Aristotelian Natural Philosophy," in S. Caroti, ed., Studies in Medieval Natural Philosophy (Olschki, 1989), pp. 237-256.

Week 15: An Assessment of Medieval Science

M 5/6: Character of late-medieval science

W 5/8: Manuscript and print (Special Collections, Memorial Library)

Lindberg, BWS, ch. 14; Dales, "Conclusion," pp. 170-176; *J. 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. X21

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

Final exam: 12:25 p.m. on Monday May 13 (always double-check time and place!).