

HPSC1001

Title: History of Science: Antiquity to Enlightenment

Syllabus

Session	2017-18
Web site	See Moodle
Moodle site	
Timetable	www.ucl.ac.uk/timetable

Description

Surveys the origins and development of science from the ancient Greeks to 1800. Main themes are the origins of science in the ancient world, the nature of the scientific revolution and the spread of science during the Enlightenment. Attend all lectures plus one tutorial per week.

Key Information

Assessment	50%	Exam 3 hrs – TBC
	50%	Essay 2,500 words – Deadline Wednesday 6 th December 2017 at 5pm
Prerequisites	None	
Required texts	None	

Module tutors

Module tutor	Prof. Andrew Gregory
Contact	andrew.gregory@ucl.ac.uk t: 020 7679 2490
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Office hours:	Tuesday 12-2 and by appointment

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Office location	
Office hours:	

Aims and objectives

Aims

The general aim of the course is to present an overview of the History of Science from its ancient beginnings up to the end of the eighteenth century. The course does not require any technical knowledge of current science. It is intended to function both as a course in its own right and as a foundation for other courses in Science and Technology Studies. It is hoped that a study of the origins and development of science will provide a better understanding of what science is now. The course is divided into three time periods, The Ancient World, The Scientific Revolution and The Enlightenment, and it is hoped that you will learn something of the scientific zeitgeist as well as the major advances of those periods; you will have to answer one question on each period in the exam.

Objectives

By the end of this module students should be able to:

By the end of the course, it is hoped that you will have acquired :

- * A working knowledge of the history of science up to 1800 - an in-depth knowledge of one topic and one instrument from that period, demonstrated in essays and exam answers.
- * Key essay writing skills; the ability to select the most important facts, to marshal those in argument and an awareness of the strengths and weaknesses of that argument.
- * Some basic historiographical skills; an awareness of anachronism and the basic methods of writing the history of science.

Schedule

	UCL Wk	Date	Topic	Activity
1	6	03/10	Introduction & Babylonian Science.	Reading on Moodle
2	6	04/10	Early Greek Science.	Reading on Moodle
3	7	10/10	TBC	Reading on Moodle
4	7	11/10	Aristotle and Plato.	Reading on Moodle
5	8	17/10	Greek Astronomy and Cosmology.	Reading on Moodle
6	8	18/10	Greek Medicine and Life Science.	Reading on Moodle
7	9	24/10	Hellenistic Science and Roman Science.	Reading on Moodle
8	9	25/10	Science in the European Middle Ages.	Reading on Moodle
9	10	31/11	The Renaissance, Science, Art and Progress.	Reading on Moodle
10	10	01/11	Copernicus and the Reform of the Heavens.	Reading on Moodle
	11		Reading Week	no lectures
11	12	14/11	Galileo Galilei.	Reading on Moodle
12	12	15/11	Bacon, Descartes and the Reform of Science.	Reading on Moodle
13	13	21/11	The Newtonian Synthesis.	Reading on Moodle
14	13	22/11	The Eighteenth Century in Outline.	Reading on Moodle
15	14	28/11	The Romantic Reaction.	Reading on Moodle
16	14	29/11	The Life Sciences in the Eighteenth Century.	Reading on Moodle
17	15	05/12	The Chemical Revolution.	Reading on Moodle
18	15	06/12	Electricity in the Eighteenth Century.	Reading on Moodle
19	16	12/12	The Steam Engine and the Industrial Revolution.	Reading on Moodle
20	16	13/12	Science Outside the Western Tradition.	Reading on Moodle

Reading list

1. Is 'Celestial Forecasting' a fair description of the activities of the Babylonians?

S. Toulmin and J. Goodfield, The Fabric of the Heavens, pp. 27-58.

O. Neugebauer, The History of Ancient Astronomy, Journal of Near Eastern Studies 4, 1945.

A.L. Oppenheim, Man and Nature in Mesopotamian Civilisation, In The Dictionary of Scientific Biography, ed. C.C. Gillispie Vol. 15 pp. 634-666.

D.C. Lindberg, The Beginnings of Western Science (Chicago U.P., 2007), Ch.1.

R. Olson, Science Deified and Science Defied, pp. 16-61.

F. Rochberg, The Heavenly Writing (Cambridge UP, 2005), Ch. 1.

J. Bottéro, Mesopotamia: Writing, Reasoning, and the Gods (Chicago, 1992)

B.L. Van Der Waerden, Basic Ideas and Methods of Babylonian and Greek Astronomy, In The Dictionary of Scientific Biography, ed. C.C. Gillispie, Vol. 15, pp. 667-680.

O. Neugebauer, The Exact Sciences in Antiquity. (New York, 1969), Chapter 5;

<http://knp.prs.heacedemy.ac.uk>

2. Did the presocratic Greeks create science?

G.E.R. Lloyd, Magic, Reason and Experience, Ch. 1.

K.R. Popper, Back to the Presocratics, pp. 136-165 of Conjectures and Refutations.

A.D. Gregory, Eureka ! The Birth of Science (Icon, 2000), Ch. 2, pp. 23-46.

D.C. Lindberg, The Beginnings of Western Science (Chicago U.P., 2007), Ch. 2.

G.E.R. Lloyd, Early Greek Science: Thales to Aristotle.

G. Vlastos, The Greeks Invent the Cosmos, pp. 3-22 of Plato's Universe.

3. What differences were there for Aristotle between the celestial and the terrestrial realms?

G.E.R. Lloyd, Aristotle: The Growth and Structure of his Thought, pp. Ch. 7.

S. Sambursky, The Physical World of the Greeks, Ch. 4.

D.C. Lindberg, The Beginnings of Western Science (Chicago U.P., 2007), Ch. 2.

G.E.R. Lloyd, Aristotle: The Growth and Structure of his Thought, pp. 57-67 and Ch. 8.

A.D. Gregory, Eureka ! The Birth of Science (Icon, 2000), Ch. 3.

T. Hankinson, J. Barnes (ed.) The Cambridge Companion to Aristotle, Ch. 5 pp. 140-167.

Aristotle, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

G.E.R. Lloyd, Early Greek Science: Thales to Aristotle, Ch. 8.

A.G. Molland, Aristotelian Science, in Companion to the History of Modern science

4. Discuss the contribution to medical science of either

a) Hippocrates

G.E.R. Lloyd, Hippocratic Writings, Introduction.

C. Singer and E.A. Underwood, A Short History of Medicine, Ch. 2.

G.E.R. Lloyd, Magic, Reason and Experience, Ch. 1.

Hippocrates, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

H.E. Sigerist, Early Greek, Hindu and Persian Medicine, pp. 317-333.

B. Farrington, Greek Science, Vol. 1 Ch. 5.

or b) Galen

C. Singer, A Short History of Anatomy and Physiology from the Greeks to Harvey, Ch. 2.

J. Rocca, Anatomy, in R.J. Hankinson, The Cambridge Companion to Galen.

V. Nutton, Ancient Medicine, Ch 16.

G.E.R. Lloyd, Greek Science After Aristotle, Ch. 9.

R.J. Hankinson, The Cambridge Companion to Galen, Ch. 10 Physiology, Ch. 11 Therapeutics.

C. Singer and E.A. Underwood, A Short History of Medicine, Ch. 3.

(general for both Hippocrates and Galen)

D.C. Lindberg, The Beginnings of Western Science (Chicago U.P., 2007), Ch. 6.

Vivian Nutton, Ancient Medicine.

P. van der Eijk, Medicine and Philosophy in Classical Antiquity (Cambridge UP, 2005)

5. Why was Aristarchus' heliocentric theory not accepted in antiquity?

T.L. Heath, Aristarchus of Samos, pp. 299-316, (Dover 1981).

A.D. Gregory, Aristarchus, in Meet the Philosophers, ed. O'Grady (Ashgate 2005)

O. Pedersen, Early Physics and Astronomy, Ch. 6, Cambridge U.P. (1993)

E. Grant, Science and Religion 400BC – 1550 AD: From Aristotle to Copernicus, Ch. 2.

Aristarchus, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

D.C. Lindberg, The Beginnings of Western Science (Chicago U.P., 2007), Ch.5.

Gingerich, O. "From Aristarchus to Copernicus", in "The Great Copernicus Chase and Other Adventures in Astronomical History". Cambridge: Cambridge University Press, 1992, pp. 63-68.

Gingerich, O. "Did Copernicus Owe a Debt to Aristarchus?", in "The Eye of Heaven: Ptolemy, Copernicus, Kepler". New York: American Institute of Physics Press, 1993, pp. 185-192.

6. What scientific progress was made during the European Middle Ages?

P. Kibre and N.G. Sirasi, The Institutional Setting: The Universities, in D.C. Lindberg (ed.), Science in the Middle Ages, pp. 120-144.

J.E. Murdoch, Philosophy and the Enterprise of Science in the Later Middle Ages, in Y. Elkana (ed.),

The Interaction between Science and Philosophy, pp. 51-74.

M. Postan, Why was Science Backward in the Middle Ages? Ch. 2 in The History of Science, ed. J. Lindsay.

D.C. Lindberg, The Beginnings of Western Science (Chicago U.P., 2007), Ch. 9 – 14.

W.A. Wallace, The Philosophical Setting of Medieval Science, in D.C. Lindberg (ed.), Science in the Middle Ages, pp. 91-119.

E. Grant, Physical Science in the Middle Ages.

7. Discuss the relation between art, science and mathematics in the Renaissance.

H. Butterfield, Renaissance Art and Modern Science, and H. Cline, Painting and Perspective, in H.F. Kearney (ed.), Origins of the Scientific Revolution.

A.G. Debus, Man and Nature in the Renaissance, Ch. 1.

W.P.D. Wightman, Science in a Renaissance Society, Ch. 1 & 3.

M. Boas. The Scientific Renaissance, 1450-1630.

J.W. Shirley & F.D. Hoening (eds.) Science and the Arts in the Renaissance.

C.S. Singleton, Art, Science, and History in the Renaissance.

8. What differences and similarities were there between Copernicus' new astronomy and what preceded it?

T.S. Kuhn, The Copernican Revolution, Ch. 5.

J.R. Ravetz, The Copernican Revolution, Ch. 14, Companion To The History Of Modern Science, ed. R. Olby Et Al.

N. Copernicus, On the Revolutions of the Heavenly Spheres.

I.B. Cohen, The Birth of a New Physics, Ch. 1-3.

Copernicus, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

R. Westman (ed.) The Copernican Achievement, (Berkeley: University of California Press, 1975).

O. Gingerich, The Book Nobody Read (Arrow, 2005)

W.T. Vollmann, Uncentering the Earth, (W&N, 2006).

9. Which experiments and reasoning led Galileo to reject Aristotle's views on motion?

S. Drake, Galileo, A Very Short Introduction, Chapter 2.

A.R. Hall, The Scientific Revolution 1500-1800, Ch. 3.

D. Shapere, Galileo and the Interpretation of Science, in Galileo, A Philosophical Study pp. 1-21.

I.B. Cohen, The Birth of a New Physics, Ch. 5.

Galileo, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

A.R. Hall, The Scientific Revolution 1500-1800, Ch. 3, The Attack on Tradition: Mechanics.

S. Drake Discoveries and Opinions of Galileo (Garden City, 1957).

10. How did Galileo use his discoveries with the telescope to support the Copernican theory, and what opposition did he have to overcome?

N.M. Swerdlow, Galileo's Discoveries with the Telescope and their Evidence for the Copernican Theory, in P. Machamer ed. The Cambridge Companion to Galileo.

I.B Cohen, The Birth of a New Physics, Ch. 4.

S. Drake, Galileo, Ch. 4 (Oxford U.P., 1980)

Galileo, The Starry Messenger.

Galileo, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

S. Drake, Discoveries and Opinions of Galileo.

G. de Santillana, The Crime of Galileo.

M. Finocchiaro, Galileo on the World Systems (Berkeley: University of California Press, 1997).

11. What is Francis Bacon's importance in the history of science?

P. Rossi, Bacon's Idea of Science, in M. Peltonen (ed.) The Cambridge Companion to Bacon.

A. Quinton, The New Method, in Francis Bacon.

J. Henry - Inventing Modern Science, in Francis Bacon: Knowledge is Power.

E.J. Dijksterhuis, The Mechanisation of the World Picture, on Francis Bacon, pp. 396-402.

C.D. Broad, Bacon and the Experimental Method, Ch. 4 in The History of Science, ed. J. Lindsay.

P. Rossi, Francis Bacon: From Magic to Science,

B. Willey, The Seventeenth Century Background, Ch. 2.

Francis Bacon, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

12. What is Rene Descartes' importance in the history of science?

D.M. Clarke, Descartes' Philosophy of Science and the Scientific Revolution, in The Cambridge Companion to Descartes, ed. J. Cottingham.

B. Williams, Descartes, Ch. 9

R.S. Westfall, The Construction of Modern Science, Ch. 2, The Mechanical Philosophy.

M. Tannery, Companion To The History Of Modern Science, ed. R. Olby Et Al. Ch. 38, Atomism and the Mechanical Philosophy.

E.J. Dijksterhuis, The Mechanisation of the World Picture on Descartes, pp. 403-417.

Descartes, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

13. Why might Newton's work be considered the culmination of the scientific revolution?

A. Koyre, The Significance of the Newtonian Synthesis, in Newtonian Studies, pp. 3-24.

I.B. Cohen, The Birth of a New Physics, Ch. 7, The Grand Design - A New Physics.

D. Cassidy, Newton's Unifed Theory (web resource).

R.S. Westfall, The Construction of Modern Science, Ch. 8, Newtonian Dynamics.

I.B Cohen, The Newtonian Revolution. Cambridge UP, 1980.

Newton, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

I.B Cohen & G.E. Smith, The Cambridge Companion to Newton.

R.S. Westfall, Never at Rest.

A.R Hall, Isaac Newton, Adventurer in Thought, pp. 179-201 and 381-386.

14. What was the 'Enlightenment Programme'?

N. Hampson, The Enlightenment, Ch.2 , Natue and Nature's God.

H.P. Reill, The Legacy of the Scientific Revolution: Science and the Enlightenment. Cambridge History of Science, vol. 4.

B. Willey, How the Scientific Revolution Affected Other Branches of Thought, Ch. 8 in The History of Science, ed. J. Lindsay

T.L. Hankins, Science and the Enlightenment, Ch. 1.

P. Gay, The Enlightenment, An Interpretation, Ch. 3, The Enlightenment's Newton.

R. Fox, Companion To The History Of Modern Science, Ed. R. Olby Et Al. Ch. 18, Laplacian Physics.

C.C. Gillispie, The Edge of Objectivity, Ch. 5, Science and the Enlightenment.

R. Porter, The Enlightenment.

15. Why was Romanticism opposed to 'Newtonian science' and what alternatives did it offer?

D.M Knight, Introduction and Ch. 1, Romanticism and the Sciences, in A. Cunningham and N. Jardine (eds.), Romanticism and the Sciences.

D. Knight, German Science in the Romantic Period, in M. Crosland (ed.), The Emergence of Science in Western Europe.

P. Gay, The Enlightenment, An Interpretation, Ch. 4.

T.L. Hankins, Science and the Enlightenment, Ch. 5 .

Goethe, Schelling, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

T.S. Hall, Ideas of Life and Matter, Ch. 25-27 and 31-34.

A. Cunningham and N. Jardine, Romanticism and the Sciences.

16. Why did the programme of mechanical biology run into trouble, and what role did vitalism subsequently play?

T.L. Hankins, Science and the Enlightenment, Ch. 5.

R.S. Westfall, The Construction of Modern Science, Ch. 5.

J. Roger, The Mechanistic Conception of Life, in D.C. Lindberg & R.L. Numbers, God & Nature, Ch. 11.

A.R. Hall, The Scientific Revolution 1500-1800, Ch. 10

P.J. Bowler, The Fontana History of the Environmental Sciences, pp. 139-193.

P.H. Reill, Storming the Temple of Error.

17. What changes in chemistry did Lavoisier bring about?

C.E. Perring, The Chemical Revolution, in Companion To The History Of Modern Science, Ed. R. Olby et al. Ch. 17

M.P. Crosland, Chemistry and the Chemical Revolution, in G.S Rousseau and R. Porter (eds.), The Ferment of Knowledge. (Cambridge: Cambridge University Press, 1980), 389-416.

M.P. Crosland, Lavoisier, In R. Porter (ed.), Man Masters Nature.

A. Donovan, Antoine Lavoisier: Science, Administration and Revolution (Oxford: Blackwell, 1983).

A. Donovan (ed.), The Chemical Revolution: Essays in Reinterpretation, Osiris, series 2, vol. 4 (1988).

T.L. Hankins, Science and the Enlightenment, Ch. 4.

W.H. Brock, The Fontana History of Chemistry, Ch. 3.

Lavoisier, Priestley in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

H.M. Leicester, The Historical Background to Chemistry.

18. Did the study of electricity become a 'Newtonian' science in the eighteenth century?

J.L. Heilbron, Ch. 9 358- 387, in G.S Rousseau and R. Porter (eds.), The Ferment of Knowledge, = J.L. Heilbron, Elements of Early Modern Physics, Ch. 3.

A. Wolf, A History of Science, Technology and Philosophy, Ch. 9.

J.L. Heilbron, Electricity in the Seventeenth and Eighteenth Centuries, Ch. XIV.

T.L. Hankins, Science and the Enlightenment, Ch. 3.

P. Fara, An Entertainment for Angels.

Gilbert, Franklin, in The Dictionary of Scientific Biography, ed. C.C. Gillispie

I.B. Cohen, Franklin's Science.

19. To what extent was the industrial revolution in Britain dependent on science?

P. Mathias, Who Unbound Prometheus?, in P. Mathias (ed.), Science and Society 1600-1900.

D.S.L. Cardwell, Power Technologies and the Advance of Science, 1700-1825, Technology and Culture, 1965, pp. 188-207.

A.E. Musson and A.E. Robinson, Scientific Prelude to the Industrial Revolution, Science and Technology in the Industrial Revolution

D.S.L. Cardwell, James Watt, In R. Porter (ed.), Man Masters Nature.

C. Smith, Energy, The Companion To The History Of Modern Science, Ed. R. Olby Et Al. Ch. 21.

Watt, in The Dictionary of Scientific Biography, ed. C.C. Gillispie.

P. Deane, The First Industrial Revolution.

D.S. Landes, The Unbound Prometheus, Ch. 2.

D.S.L. Cardwell, Science and the Steam Engine, in P. Mathias (ed.), Science and Society 1600-1900

Specific Criteria for Assessment for this Module:

In addition to the criteria indicated in the STS Student Handbook, the following are the main criteria on which your essay will be marked. There are no set numbers/ percentages associated with these criteria but we will give you qualitative feedback based on them.

Referencing

You must reference all quotes and all references/ summaries of books, etc. Pick one system for referencing and stick to it. Refer to individual page numbers, not just whole texts, whenever possible.

Bibliography

You need to supply a bibliography of all works referenced. You must supply author, title, date, place of publication and publisher.

Answers question?

Read the question carefully and answer it specifically – do not give irrelevant material or drift into answering other questions.

Organisation

Is the essay organized into an introduction, main body and conclusion? Does each part flow naturally into the next one? Is the evidence in a logical order?

Introduction

You should give an introduction to your essay in no more than one or two paragraphs. Introduce your topic and your line of argument, no more. Good introductions are concise and precise.

Clarity

We place great emphasis on clarity of argument and expression. Avoid ambiguity and vagueness. Do not assume your reader already knows what you are talking about. Try to keep your line of argument clear. It often helps clarity to divide the main body of the essay into sections (typically three or four for a 2500 word essay). Accurate spelling, grammar, and punctuation also improve clarity.

Argumentation

Is the main argument of the essay clear, coherent and persuasive? Is it properly supported by the evidence available?

Conclusion

Your essay should have a conclusion which is clearly marked as such (new paragraph, 'In conclusion...'). It should be substantial in summing up what you have argued and exploring the implications of what you have argued.

Reading/ use of sources

How well have the readings and other resources been used? Does the essay reflect them accurately? Is the essay overly dependent on one source?

Independent critique?

Does the essay offer some independent critique or thought on the question or does it merely report what is in the literature? In second and third-year courses this is an essential component of essays.

Historiography?

How aware is the essay of assumptions and methods used to construct an argument or to evaluate it? Does the essay discuss what authors have said about the topic and offer some critique of them?