HPSC1001
Title: History of Science: Antiquity to Enlightenment

Syllabus

<table>
<thead>
<tr>
<th>Session</th>
<th>2017-18</th>
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<tbody>
<tr>
<td>Web site</td>
<td>See Moodle</td>
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<td>Moodle site</td>
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<tr>
<td>Timetable</td>
<td><a href="http://www.ucl.ac.uk/timetable">www.ucl.ac.uk/timetable</a></td>
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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

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<tr>
<th>Assessment</th>
<th>50%</th>
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<tr>
<td></td>
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<td>Exam 3 hrs – TBC</td>
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<td></td>
<td>50%</td>
<td>Essay 2,500 words – Deadline Wednesday 6th December 2017 at 5pm</td>
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| Prerequisites | None |
| Required texts | None |
Module tutors

<table>
<thead>
<tr>
<th>Module tutor</th>
<th>Prof. Andrew Gregory</th>
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<tbody>
<tr>
<td>Contact</td>
<td><a href="mailto:andrew.gregory@ucl.ac.uk">andrew.gregory@ucl.ac.uk</a></td>
</tr>
<tr>
<td>Web</td>
<td><a href="http://www.ucl.ac.uk/silva/sts/staff/gregory">http://www.ucl.ac.uk/silva/sts/staff/gregory</a></td>
</tr>
<tr>
<td>Office location</td>
<td>1.1, 22 Gordon Square, Room</td>
</tr>
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<td>Office hours:</td>
<td>Tuesday 12-2 and by appointment</td>
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<table>
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<tr>
<th>Assistant</th>
<th>Rebecca Martin</th>
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<tbody>
<tr>
<td>Contact</td>
<td><a href="mailto:rebecca.martin.15@ucl.ac.uk">rebecca.martin.15@ucl.ac.uk</a></td>
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<tr>
<td>Office location</td>
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<td>Office hours:</td>
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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.
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<tr>
<th>UCL Wk</th>
<th>Date</th>
<th>Topic</th>
<th>Activity</th>
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<tr>
<td>1</td>
<td>6</td>
<td>03/10 Introduction &amp; Babylonian Science.</td>
<td>Reading on Moodle</td>
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<tr>
<td>2</td>
<td>6</td>
<td>04/10 Early Greek Science.</td>
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<td>3</td>
<td>7</td>
<td>10/10 TBC</td>
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<td>4</td>
<td>7</td>
<td>11/10 Aristotle and Plato.</td>
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<td>5</td>
<td>8</td>
<td>17/10 Greek Astronomy and Cosmology.</td>
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<td>8</td>
<td>18/10 Greek Medicine and Life Science.</td>
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<td>7</td>
<td>9</td>
<td>24/10 Hellenistic Science and Roman Science.</td>
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<td>8</td>
<td>9</td>
<td>25/10 Science in the European Middle Ages.</td>
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<td>9</td>
<td>10</td>
<td>31/10 The Renaissance, Science, Art and Progress.</td>
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<td>10</td>
<td>10</td>
<td>01/11 Copernicus and the Reform of the Heavens.</td>
<td>Reading on Moodle</td>
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<tr>
<td>11</td>
<td>11</td>
<td>Reading Week</td>
<td>no lectures</td>
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<td>11</td>
<td>12</td>
<td>14/11 Galileo Galilei.</td>
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<td>12</td>
<td>12</td>
<td>15/11 Bacon, Descartes and the Reform of Science.</td>
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<td>13</td>
<td>13</td>
<td>21/11 The Newtonian Synthesis.</td>
<td>Reading on Moodle</td>
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<td>14</td>
<td>13</td>
<td>22/11 The Eighteenth Century in Outline.</td>
<td>Reading on Moodle</td>
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<td>15</td>
<td>14</td>
<td>28/11 The Romantic Reaction.</td>
<td>Reading on Moodle</td>
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<td>16</td>
<td>14</td>
<td>29/11 The Life Sciences in the Eighteenth Century.</td>
<td>Reading on Moodle</td>
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<td>17</td>
<td>15</td>
<td>05/12 The Chemical Revolution.</td>
<td>Reading on Moodle</td>
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<td>18</td>
<td>15</td>
<td>06/12 Electricity in the Eighteenth Century.</td>
<td>Reading on Moodle</td>
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<tr>
<td>19</td>
<td>16</td>
<td>12/12 The Steam Engine and the Industrial Revolution.</td>
<td>Reading on Moodle</td>
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<tr>
<td>20</td>
<td>16</td>
<td>13/12 Science Outside the Western Tradition.</td>
<td>Reading on Moodle</td>
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Reading list

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


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

2. Did the presocratic Greeks create science?

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

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?


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


4. Discuss the contribution to medical science of either

a) Hippocrates


or b) Galen

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

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)


Vivian Nutton, Ancient Medicine.


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


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.


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


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.


E. Grant, Physical Science in the Middle Ages.

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


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.


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.

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?

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.
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?

I.B Cohen, The Birth of a New Physics, Ch. 4.
S. Drake, Galileo, Ch. 4 (Oxford U.P., 1980)

Galileo, The Starry Messenger.
S. Drake, Discoveries and Opinions of Galileo.
11. What is Francis Bacon's importance in the history of science?


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


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


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


D. Cassidy, Newton’s Unified Theory (web resource).

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


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.

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.


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.


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


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.


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.

17. What changes in chemistry did Lavoisier bring about?


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

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


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?


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


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?