



University of Cambridge International Programmes

INTERNATIONAL SUMMER SCHOOL TERM II 2007

D10 RENAISSANCE ARTS AND SCIENCE: BRUNELLESCHI TO GALILEO

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Mathematical Statistics, University of Cambridge**

Course description

In this course we are going to look at something we all know about to some extent – the Renaissance – but from what may be a rather different point of view. The traditional view of the Renaissance has been dominated by historians of art and the humanities, and the general impression of the Renaissance is of a period of great flourishing of the *arts*. We all know of Michelangelo and Raphael ... and that supposedly quintessential Renaissance man: Leonardo da Vinci.

These lectures will tell a different story of the Renaissance: roughly speaking, the rediscovery and the ambition to re-create the science and technology of ancient Greece and Rome. The story is complicated, and has moments of high drama (and plenty of farce, too). It also had far more impact on the development of modern science than many a history of science would tell: although the Renaissance was not a period of great and dramatic “discoveries” in the pure or applied sciences, Renaissance arguments about science (what there is in the world, what we can know about it, how to gain knowledge of the world ... and why bother?) were the foundations upon which the Scientific Revolution was built.

In the process of recovering and re-starting ancient science Renaissance natural philosophers or scientists re-interpreted it all in a completely new light, and this led scientific thinking in radical new directions. Many of these explorations look strange or foolish or just pointless to modern eyes, but they served to break the bounds of long established ways of thinking, and give natural philosophers the tools to find new ways of thinking about and investigating the causes of natural phenomena. Of equal importance, however, was a subtle shift in the social and intellectual status of some kinds of ‘scientists’ and practitioners.

In these lectures we will look at a number of different scientists and different fields, from astronomy to engineering, theology to architecture and even the literary ambitions of

artillery officers (yes, it all fits together) to see how extraordinarily rich and innovative thinking was in a range of areas in the sciences and applied arts or engineering over the fifteenth and sixteenth centuries. Whilst artists, architects, engineers and natural philosophers were hungry for knowledge and social status, incorporating often seemingly bizarre ideas into their work, many of their works slowly shook the very foundations of society. The re-workings of Ptolemy by Copernicus, and then Copernicus by Galileo resulted in discoveries and theories which placed the sun at the centre of the world... and thus, in the eyes of the Church, changing the very relationship between God, his creation, and human kind.

At the end of it you might be considerably less impressed with Leonardo da Vinci as a “universal man of the Renaissance” or that sort of cliché, but you will appreciate and understand a great deal more what he, and lots of others, were doing and why, and why it had such important consequences for everything that was to follow. The world of the Renaissance scientist is a far cry from a boffin in a lab coat: this was a world of competition, rivalry, hunger, money, brawls, bodies, arrests, inquisitions, courts, expulsions and imprisonments.... the *real* Renaissance. Renaissance art may be very cool, but Renaissance science changed the world forever. Not for the squeamish.

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Lecture programme

- 1 Arabic transmission and the high middle ages
- 2 And in the beginning: the ambition to discover better classical sources; the Florentine bankers and Chrysolarus
- 3 Brunelleschi: the building of the Cathedral dome
- 4 The *grecisti*; the recovery of Byzantine texts; the Grand Ecumenical council; the Greek refugees, Bessarion
- 5 Plato: read, translated, and a radical Christian (mis)-interpretation
- 6 Radical Platonism and astronomy: Copernicus and Kepler
- 7 But this isn't science at all!
- 8 Classical engineers and Renaissance engineers: fifteenth century
- 9 The changing social status of engineering: the case of Tartaglia
- 10 Engineering ambitions and Galileo: instruments, experiments, and an Archimedean polemic

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Essay topics

- 1 Kepler wrote "I never read *the Timaeus* except on bended knee." Explain what he might have meant, and why he might have thought such things.
- 2 Outline, and defend the *reasonableness* of the mystic, animate conception of nature in the Renaissance.
- 3 Discuss how Copernicus' astronomy and his astronomical thinking may have been completely different from our modern interpretation of heliocentricity.
- 4 "Humanism was essentially an intellectual project about literature and the arts." Discuss.
- 5 How important were the military arts in the development of scientific thinking in the fifteenth and sixteenth centuries?
- 6 Discuss the significance of one or some of the so-called Greek Refugees of the middle of the fifteenth century.
- 7 What were the "scientia media" and why do they matter – and change – over the middle ages and renaissance?
- 8 Discuss the ways in which Galileo can be seen as a continuation of renaissance thinking, or a complete and radical break with renaissance thinking.
9. "Medicine was unaffected by the renaissance." Discuss.

Before you decide which question you are going to answer, please read carefully the following sections of your student handbook:

- 'Evaluation notes for Students and Institutions'
- 'How to write an essay' - guideline notes
- 'Plagiarism and Paraphrasing'

Please also consult your programme timetable for the time of your evaluation information session and make sure that you attend.

If you are unsure about any aspect of writing your essay, please discuss this with either your Course Director or a member of the Summer Schools staff.

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Reading in advance of the programme

Every participant is expected to prepare for each course by undertaking substantial preliminary reading. The following reading list has been compiled by your Course Director – a broad familiarity with these books will greatly enhance your understanding and enjoyment of the lectures, and good preparation by all members will contribute significantly to the success of the course: classes will be conducted on the assumption that reading has been undertaken. Complete ignorance of these books before your arrival in Cambridge would obviously represent a serious disadvantage.

Every text listed here will aid your preparation for the course. To help you plan your reading, they have been divided into categories of differing priority:

Books marked with two asterisks (**) are the highest priority to read. You will find it hard to follow the course if you have not read them before you arrive.

Books marked with one asterisk (*) are the next most important ones to read.

Of course, you are welcome to read relevant sources not listed here as general preparation for your course, but this should be *in addition to* the sources listed here. Remember, your Course Director will assume that you have read from this list.

Reading List

As background reading for this course, you should have a reasonably careful read of **at least one** of the (**) books, and then you should spend a bit of time in your local library having a read around the lives and work of Brunelleschi and Leonardo da Vinci ... not just as artists, but as practical engineers.

One of the best general works on the background to this course is:

KRISTELLER, Paul O

****Renaissance Thought and Its Sources**
(1981, 1990 Columbia University Press,
expanded edition, 0231045131) paperback

And although it is very old, an excellent introduction to the scientific story that we will be looking at is to be found in:

HALL, Marie Boas

****The Scientific Renaissance, 1450-1630**
(1994 Dover Publication, 0486281159)
paperback

For the story of the radical naturalist renaissance, you should look at:

DEBUS, A G

****Man and Nature in the Renaissance**
(1978 Cambridge University Press, 0521293286)
paperback

Further works you might care to look at (but go into much more detail than is necessary) are such as:

DEBUS, A G

The Chemical Philosophy
(2003 Dover Publications, 0486421759)
paperback

YATES, Frances

The Occult Philosophy in the Elizabethan Age
(2001 Routledge, 0415254094) paperback

YATES, Frances

The Rosicrucian Enlightenment
(2001 Routledge, 0415267692) paperback

BARCLAY PARSONS,
William

**Engineers and Engineering
in the Renaissance**
(1976 The MIT Press) OUT OF PRINT
(don't try to read this all: just have a look through
it)

If your library has them, you might look at (these are too expensive to purchase, and not worth the investment):

GALLUZZI, Paolo (editor)

Leonardo Da Vinci: Engineer and Architect
(1988 McClelland and Stewart Inc.)
hardback & paperback OUT OF PRINT

GALLUZZI, Paolo

**Renaissance Engineers from Brunelleschi to
Leonardo da Vinci**
(1998 Giunti) paperback OUT OF PRINT

And otherwise, you should have a hunt around your local library for anything easily available on Philipo Brunelleschi, Leonardo da Vinci, and Copernicus. Just a general familiarity with the lives of these chaps and what they did will be a very good introduction to the course.

Finding the books

We hope that you will be able to obtain the majority of books on your course reading lists. If you cannot find the books in the editions specified, use alternative editions or even, if necessary, translations. In some cases, Course Directors have listed important texts that are currently 'Out-of-print', which means you cannot buy new copies of these books. You should look for these books in college libraries, second-hand bookshops, or online using websites such as **abebooks.com** and the second-hand books section of **amazon.com**.

Individual copies, or in some cases a limited number of copies, of many of the cited texts can be found in the Institute's Summer Schools library or the faculty libraries when you get to Cambridge.

Although both new and second-hand copies of the listed book may be available from Cambridge's many bookshops, you are advised to consult as many as possible of the books **before you arrive in Cambridge**. It is **not** necessary to bring all of the books on your booklist with you to Cambridge.