

The age of power: science and globalization in the 18th century

Start date 10 February 2023 **End date** 12 February 2023

Venue Madingley Hall
Madingley
Cambridge
CB23 8AQ

Tutor Dr Patricia Fara **Course code** 2223NRX020

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Tutor biography

Patricia Fara is an Emeritus Fellow of Clare College, Cambridge; she is also President of the Antiquarian Horological Society and a Fellow of the Royal Historical Society. She writes and lectures widely on the history of science, is a regular contributor to *In our Time* and other radio/TV programmes, and was awarded the 2022 Abraham Pais prize by the American Physical Society. Her books include *Science: A Four Thousand Year History* (2009) (translated into nine languages), *A Lab of One's Own: Science and Suffrage in World War I* (2018) and *Life after Gravity: Isaac Newton's London Career* (2021).

Course programme

Friday

Please plan to arrive between 16:30 and 18:30. You can meet other course members in the Terrace Bar which opens at 18:15. Tea and coffee making facilities are available in the study bedrooms.

19:00	Dinner
20:30 – 22:00	1667: A Manifesto for the Future
22:00	Terrace Bar open for informal discussion

Saturday

07:30	Breakfast (for residents only)
09:00 – 10:30	Gravity: The Newtonian Empire
10:30	Coffee
11:00 – 12:30	Electricity: Revolutionary Sparks
13:00	Lunch
14:00 – 16:00	Free time
16:00	Tea
16:30 – 18:00	Steam: The Lunar Society of Birmingham
18:00 – 18:30	Free time
18:30	Dinner
20:00 – 21:30	Empire: Exploration or Exploitation?
21:30	Terrace Bar open for informal discussion

Sunday

07:30	Breakfast (for residents only)
09:00 – 10:30	Life: Mary Shelley's <i>Frankenstein</i>
10:30	Coffee
11:00 – 12:30	Women: <i>Il Newtonianismo per le Dame</i>
12:45	Lunch

The course will disperse after lunch

Course syllabus

Aims:

The course will allow you to:

1. Gain a greater understanding of the English Enlightenment.
2. Appreciate the close links between politics, science, commerce and empire.
3. Recognise the multiple roles played by women in science's history.

Content:

Knowledge is Power

The dictum of Elizabethan philosopher Francis Bacon inspired many generations of British researchers, fuelling not only their experimental approach towards the world but also their expansionist ambitions. Far from being an abstract intellectual exercise, science was rooted in political and commercial interests, relying mainly on private initiative and investment with relatively little support from government financing. By the end of the 18th century, Newtonian science had eclipsed its competitors, British industry was booming and the nation's territorial possessions were spreading around the world. Although the term 'scientist' had not yet been coined, this was a crucial foundational period for modern scientific society.

These seven talks explore ways in which power was harnessed in bids for technological progress, economic gain and global influence. Drawing liberally on art, literature and politics, they demonstrate that scientific achievements are inseparable from their cultural context.

1667: A Manifesto for the Future

In the turmoil following the Civil War, the plague and the Fire of London, 1667 was a year of utopian optimism. The first blood transfusion from an animal into a human being was performed, Robert Hooke's *Micrographia* was republished, Isaac Newton became a Fellow of Trinity College, and Thomas Sprat's *The History of the Royal-Society of London* appeared. Less a history than a manifesto for the future and designed to convince Charles II that experimental research was a worthwhile investment, this book forms the focus of a lecture describing the aims and activities of the early Royal Society, when education followed the medieval curriculum and the word 'scientist' had not yet been invented. It discusses two complementary aspects of the Fellows' Baconian philosophy – experiment and travel – by analysing Sprat's frontispiece, which features three types of instrument: mathematical (as taken over from surveyors, navigators, etc); optical (microscopes and telescopes); and natural philosophical (Robert Boyle's air-pump). Emphasis is placed on the Royal Society's global ambitions, underpinned by Francis Bacon's aphorism that 'Knowledge is Power.' Sprat praised 'the Royal Society's Twin-Sister,' an early joint-stock company also founded in 1660 that claimed exclusive trading rights along the coast of Guinea. As well as profiting from it financially, Fellows used the Company to solicit information about minerals, wildlife and human societies. As Sprat knew, science, imperialism and finance were inextricably linked.

Gravity: The Newtonian Empire

Newton's ideas underpinned a worldview characterised by central control, uniformity and mathematization – Newtonian imperialism. Metaphorically, Britain lay at the hub of a global system, dominating the world by importing unprocessed materials and exporting the products of civilization, including scientific knowledge. Furthermore, as head of the Royal Mint for 30 years, Newton profited from the triangular trade in gold, sugar and enslaved peoples. After he described the cosmos in equations, the Enlightenment faith spread that numbers are what count: quantification now also embraced the natural and the human worlds.

Electricity: Revolutionary Sparks

Electrical machines were the most exciting invention of the 18th century – 'An Entertainment for Angels,' enthused one fictional young woman. Initially, these powerful new instruments produced, stored and discharged static electricity, but in 1800 the first battery appeared that could generate a continuous current. Electrical experts earned money through their dazzling performances, but they also promised humanitarian benefits, such as medical cures and agricultural improvements.

Particularly through association with Benjamin Franklin, electricity came to symbolise a revolutionary and more democratic future.

Steam: The Lunar Society of Birmingham

Steam engines were first used in Cornish mines, but during the 18th century they were recruited to power Midlands machines. The Lunar Society – an informal group of 12 inventors, factory owners, doctors and social reformers – met to exchange ideas every month. They are credited with making England the first European country to embark on industrialization by introducing mechanization, embracing science and developing efficient transport networks. Several members were also politically active, campaigning to abolish international slavery, expand women's education and improve working conditions.

Empire: Exploration or Exploitation?

The 18th century is often called the Age of Discovery, but many apparently scientific voyages of exploration were also motivated by ambitions to acquire natural resources, secure foreign territory and establish trade deals and markets for British goods. Global ecology altered irreversibly as crops, animals and plants were transported around the world. As a case study, this lecture focuses on Joseph Banks, the botanist who sailed to Australia with James Cook and ruled the Royal Society for 42 years: he exemplifies British ambitions and the power of royal patronage.

Life: Mary Shelley's *Frankenstein*

Often said to be the first work of science fiction, *Frankenstein* provides an extended and subtle commentary on science's influence over society and the ethical problems that arise. The book originated as a ghost story, but developed to include the latest scientific topics including polar exploration, electricity and chemistry. Extremely well-informed, Mary Shelley also drew on other fields to consider central questions that remain unresolved – the nature of life, the distinctions between people and animals, and the moral price of progress.

Women: *Il Newtonianismo per le Dame*

This session discusses a particular book – *Il Newtonianismo per le Dame* (1737), by the Venetian Francesco Algarotti – and also the role of women as audiences, translators and critics in the spread of Newtonian science during the 18th century.

Presentation of the course:

Each session will consist of an illustrated lecture, but free discussion will also play an important part.

As a result of the course, within the constraints of the time available, students should be able to:

1. Bring greater critical awareness to historical accounts.
2. Appreciate the importance of history for modern debates.
3. Recognise the significance of images as sources of information.
4. Debate the existence of the supposed two-cultures divide.

Reading and resources list

No reading is compulsory for this course, but the following books are relevant:

Shelley, Mary. *Frankenstein: 1818 text*. OUP World Classics, 1993 (including the excellent introduction)

Uglow, Jenny. *The Lunar Men* (any edition)

Holmes, Richard. *The Age of Wonder* (any edition)

In addition, I have published several books on the 18th century, including *Life after Gravity* (on Isaac Newton), *Sex, Botany and Empire* and *An Entertainment for Angels* (on electricity).