Course Description

How did modern science, medicine and technology become dominant through globalization?

This class takes a global approach to the development of science, medicine and technology. The early modern period of global history has long been seen as the era when the world assumed its current form.

One dominant story about the rise of modernity focuses on science, medicine and technology: how Europeans developed experimental techniques of unprecedented power for knowing and exploiting nature. A second origins story identifies modernity with the collision of cultures produced by European imperialism, bringing Americans, Africans, Asians and Europeans into contact as never before, and spawning new worldviews ranging from cosmopolitanism to Orientalism and racism.
But how did these two processes of modernization relate: how were science, medicine and technology transformed by globalization and the movement of peoples - and how were cultural identities transformed by science?

We examine how knowledge traveled through global networks stretching from Asia to the Middle East, Europe and America, exploring how science created new attitudes to nature (and the roots of our current ecological crisis) and new globalized social identities still with us today.

All Readings Available via Sakai

We will work from a selection of essays and extracts listed on Sakai under Resources by last name of the author: https://sakai.rutgers.edu/portal. (Essays listed below with a weblink are not on Sakai.) There are no set books to purchase and no books on library reserve for this course. Lecture outlines will be posted after relevant lectures for the purposes of review.

Electronics Policy

In order to foster the best possible conditions for learning, thought and engagement, the class policy is that **no laptops, tablets, phones or other electronic devices are permitted in class.** All students are asked to abide by this policy and help create a distraction-free environment - for which your help is appreciated. Please bring paper (or a journal) and pen to take notes by hand. Writing notes by hand remains a highly effective method for translating class discussions into one’s own thoughts on any given subject - beginning the process of writing and reflection that will generate material for discussion, written assignments and exam answers.

Lectures and Readings

Lectures combine discussions of the readings with attention to the larger themes of the course beyond any single reading. Students should complete readings before coming to class and are encouraged to review them afterwards. These are in general short to allow for more time for reflection. It is crucial to take some form of notes as you read, even brief ones, preferably annotations in which you begin to formulate your own thinking. Bear in mind the prompt under each unit heading as you read. You will not need to consult any extra materials beyond the syllabus to complete the assignments.

Questions and comments are encouraged in lectures. But active verbal participation is expected in discussions, for which you should bring your notes on relevant readings or, especially in the case of primary source material, a hard copy of the assigned readings. For these occasional sessions, marked “DISCUSSION,” we will break into two groups, one of which will work with Prof Delbourgo in FH A6, the other with Paul Sampson in Scott Hall (CAC) Room 204.

Attendance

Attendance of both lectures and discussions is expected and attendance will be taken from 30 January via a sign-in sheet. Please arrive promptly but make sure you sign at the end if late. Students will be penalized 3% on the final grade for the course for every unexcused absence beyond three absences. An excused absence must be documented with a note, medical or otherwise.

Office hour visits are warmly encouraged. Both the professor and teaching assistant are eager to help you enjoy the course as much as possible, discuss class material and help you with any problems. Don’t be shy! For best results email in advance to set up an appointment.
Assignments

10%  Attendance and verbal contribution to discussions
15%  Short take-home paper on Islamic Caliphates
20%  Midterm: Mexico and China
15%  Short take-home paper on Japan
40%  Final: Europe and India

Academic Integrity

You should ensure that any written work you submit for evaluation is the result of your own thought and writing and that it reflects your own work and not that of another student. Copying work – plagiarism – and/or failure to complete any assignment will result in an F for the course.

Students needing academic adjustments or accommodations because of a documented disability must present relevant documentation to this effect as soon as possible.

SCHEDULE

PART 1: WHAT IS THE HISTORY OF SCIENCE?

Weds 18 Jan  Introduction and Welcome

Where in the world do you want to go and why? What’s the connection between science, technology and globalization? Word Association: “Chocolate.”

Mon 23 Jan  The ‘Scientific Revolution’ & ‘Modern Western Science’

What is the classic narrative of the history of science and who invented it? What do we mean by “modern western science”?


Weds 25 Jan  Networks: From the Lab to the Field

How does Bruno Latour use networks to understand science as a form of labor across distance via the notion of translation? How do networks help us see science as a global phenomenon?


PART 2: CALIPHATE & OTTOMAN SCIENCES
Mon 30 Jan  Science in the Islamic Caliphates

How did knowledge of the natural world flourish in the medieval Islamic Caliphates? How did their science relate to religion and what is the significance of their translation culture?

James McClellan and Harold Dorn, Science and Technology in World History (Johns Hopkins University Press, 1999), pp. 103-115


Weds 1 Feb  Islam and Science: Polemics

What is the debate about Islamic science during the period of the Caliphates? What difference did learning about Islamic science make to Derek Black? And what kind of ‘scientist’ was the alchemist Jābir (and who was ‘Geber’)?


Al-Khalili, “The Lonely Alchemist,” House of Wisdom chapter on Jābir ibn Hayyān, pp. 52-66

Mon 6 Feb  DISCUSSION: JĀBIR IBN HAYYĀN IN TRANSLATION

What kind of alchemist was Jābir and why were the English interested in translating him?


Weds 8 Feb  Knowing the World? Ottoman Geography

To what extent were Ottoman geographers curious about the world beyond their own empire and why is this question important? Compare how Burns and Casale approach Ottoman sciences: which is better and why? How do different maps shape our perceptions of the world?


Giancarlo Casale, The Ottoman Age of Exploration (Oxford UP, 2010), pp. 180-203

* SHORT PAPER on JĀBIR DUE IN CLASS MON 13 FEB *
PART 3: AMERICA

Mon 13 Feb America before Columbus

How did native peoples make knowledge in pre-contact Central and South America? What are the strengths and weaknesses of Montellano’s account of “empirical Aztec medicine”? And what does chocolate taste like?

McClellan and Dorn, *Science and Technology in World History*, pp. 155-167


*An Aztec Herbal: The Classic Codex of 1552 [Codex Badianus]*, trans. and ed. William Gates (1939; Dover, 2000): xxxvii-lxiv & end-papers

Weds 15 Feb Columbian Exchange: Chocolate as Natural History

How did Spanish colonization transform the natural environments of the Atlantic world? How did knowledge about chocolate travel from the Mayans and Aztecs to the Spanish? Compare Norton’s approach to native knowledge with Montellano’s.


Mon 20 Feb Mexico: Creole American Sciences

How did Spanish-Americans use native sources to produce their own Creolized and Baroque forms of knowledge? What does Cañizares mean by “patriotic epistemology” and what are both the stakes and costs in vindicating Spanish science?


Weds 22 Feb DISCUSSION: AZTECS & HERNÁNDEZ

How did Hernández collect knowledge about Mexico through interacting with the Aztecs?

*The Mexican Treasury: The Writings of Dr. Francisco Hernández*, ed. Simon Varey (Stanford University Press, 2000), selections

PART 4: EAST ASIA
Mon 27 Feb  China: Celestial Inventors & Barbarian Outsiders

What was early modern China’s stance regarding the wider world and how did it organize its pursuit of scientific knowledge? What is the significance of discussions of Chinese “inventiveness”?

McClellan and Dorn, *Science and Technology in World History*, pp. 117-140

Weds 1 Mar  Jesuit Missionaries & Qing Imperialists

How did religion and science converge in Qing interactions with Jesuit missionaries? How did the Qing aim to govern the new peoples and lands of their empire through cartography and ethnography? How does early modern history still shape contemporary Chinese science?


Mon 6 Mar  DISCUSSION: CHINA AND COURSE REVIEW TO DATE

Qianlong Emperor’s Letter to King George III (1793)

Weds 8 Mar  MIDTERM

13-15 March  SPRING BREAK

Mon 20 Mar  Japan: Isolation or Traffic?

What are ‘go-betweens’ and how does the relationship between the Dutchman Kaempfer and the Japanese Eisei help us understand both the larger forces and personal motivations that made knowledge circulate? How are today’s museums a legacy of early modern globalization?


Weds 22 Mar  Dutch Technology in Japanese Culture
How does the reception of Dutch technology challenge standard notions of ‘technology transfer’? How was the Japanese reception of foreign technology translated into their own cultural terms? And why are Japanese robots different from western ones?


“Robot-Staffed Hotel Opens in Japan,” *CBS This Morning* 2015: https://www.youtube.com/watch?v=HVVk0b9DX8Q

*SHORT PAPER on JAPAN DUE IN CLASS MON 27 MAR*

**PART 5: EUROPE AND ITS COLONIES**

**Mon 27 Mar**  
Colonial Botany and the Atlantic Slave Trade

*How did the science of botany rely on the business of trade, including the slave trade? How did Africans in diaspora become effective herbalists and healers and how much of what they did can we reconstruct? How do the histories of slavery and science relate?*


**Weds 29 Mar**  
Europe’s “New Science”: Old v New Narratives

*How did big-picture European understandings of the natural world change during the 17th century and why? What are the strengths and weaknesses of the classic scientific revolution story and what would count as a better story?*

Burns, *Scientific Revolution in Global Perspective*, pp. 57-74


**Mon 3 Apr**  
**DISCUSSION: SCIENCE, SLAVERY AND GENDER**

*How were women and enslaved Africans part of the globalization of early modern science?*


Maria Sibylla Merian, Letter to Johann Volkammer, 1702
Weds 5 Apr          Global Newton

*How did the science of Isaac Newton, allegedly an isolated scientific genius, depend on colonial networks? What is an “information order”? How did his work in physical science use similar methods to natural history and why is this important for the history of science as a whole?*


### PART 6: ORIENTALISM TO POSTCOLONIALISM TO TODAY

Mon 10 Apr           India: The Mughal Empire

*What scientific and medical traditions flourished in India both prior to and after European contact? How did different peoples and traditions interact in the making of French traveler L’empereur’s work on Indian botany? What role do pictures play in scientific knowledge?*

McClellan and Dorn, *Science and Technology in World History*, pp. 141-149


Weds 12 Apr          Orientalism: Culture and Imperialism

*How did Orientalism cast European knowledge as the future and Indian knowledge as the past and why did this idea take such aggressive form in the late 18th century? Why did the British start translating ancient Indian texts like the Bhagavad Gita?*


Charles Wilkins, *The Bhagvat-Geeta* (London, 1785), pp. 1-26 [only](#)

Mon 17 Apr            Newton in India

*Why did Tafazzul Hussain Khan translate Newton into Arabic and how did the British interpret the significance of this translation in relation to Orientalism? How did their views express their own sense of identity and sense of historical time?*


Weds 19 Apr           The Globe in 1800: A Mechanical or Revolutionary World?
What was Humboldtian science and how did it combine both instruments and the human body, both scientific discipline and artistic cultivation, as a way to understand the world as a whole? Did electric eels suggest nature was mechanical and predictable or alive and uncontrollable?


Alexander von Humboldt, Personal Narrative of a Journey to the Equinoctial Regions of the New Continent (1814-1825): chap. 14 only on electric eels

Mon 24 Apr Modern without Western?: Postcolonialism

What is ‘postcolonialism’ and what is meant by the notion of ‘alternative modernities’? How did Gandhi and Nehru articulate different visions of India as a modern nation based on science, medicine and technology? Was it desirable or possible to become modern without becoming western?


Gyan Prakash, Another Reason: Science and the Imagination of Modern India (Princeton UP, 1999), pp. 190-226

Weds 26 Apr Nationalism vs. Globalization: Hindutva and Science Today

How do the histories of imperialism, Orientalism and postcolonialism help us to understand the polemics surrounding ‘Hindutva’ (Hindu cultural nationalism) and science and technology in India today?

Background:


Debate about the Murty Indian Classical Library of Harvard University Press:


http://thewire.in/24450/swadeshi-indology-and-the-destruction-of-sanskrit/

Meera Nanda, “Hindutva’s Science Envy,” Frontline (Sept. 2016) and response in Hindu Post:
http://www.frontline.in/science-and-technology/hindutvas-science-envy/article9049883.ece

http://www.hindupost.in/society-culture/meera-nandas-freudian-slip-reveals-hinduphobia/

Mon 1 May FINAL DISCUSSION AND COURSE CONCLUSION
Why does globalizing the history of science matter?


* SCHEDULED FINAL EXAM *