Emergence of Modern Science (Summer II 2024)

University of Pennsylvania

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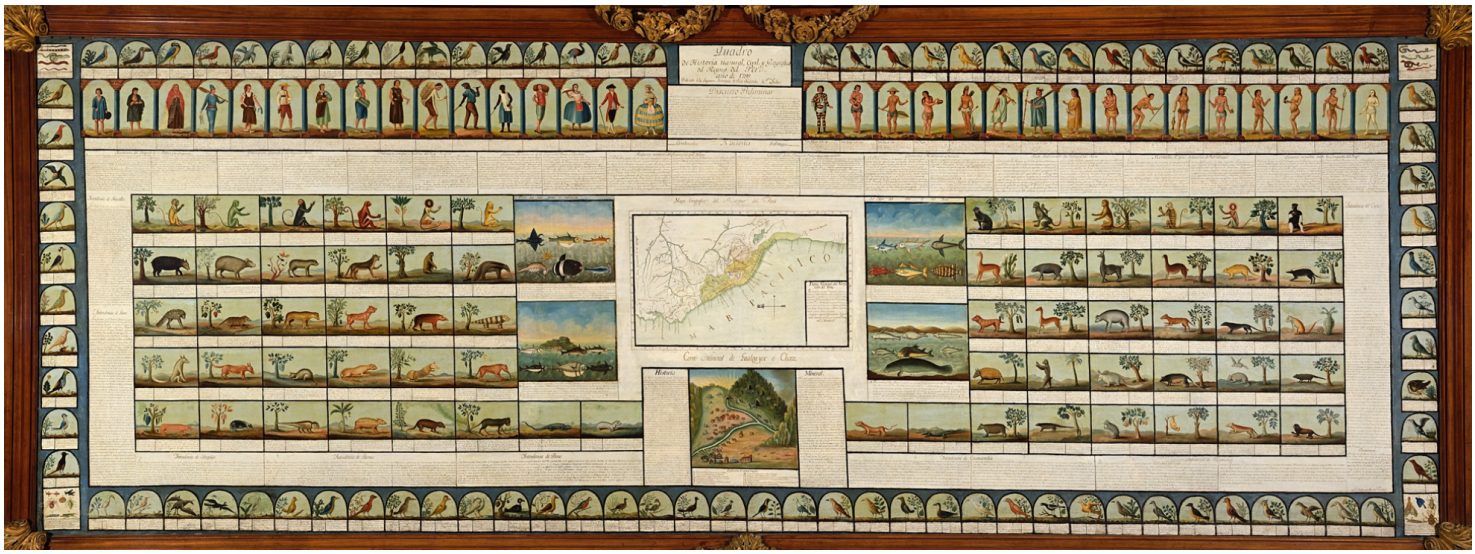

"Quadro de Historia Natural, Civil y Geográfica del Reyno del Perú, José Ignacio de Lequanda and Louis Thiébaut, 1799, Museo Nacional de Ciencias Naturales, Madrid.

Overview

From the algorithms of our "for you pages" on TikTok to routine COVID boosters to our ongoing concerns about the climate crisis, modern science saturates our daily life. But what exactly is science and why is it modern? And how did it come to loom so large in our lives? These are the core questions that we will explore together. To address this question, we will focus on how knowledge has been produced, by whom, with what stuff, where in the world, and for what purpose(s).

To take a global approach, we begin this story in ships of Portuguese colonists and the forests of colonial Spanish America, tracing how knowledge has been made (and remade) through the laboratories of Britain, the collection of Peruvian ancestors, the labor of Black computer technicians, and forensic testing in Mexico. This course proceeds chronologically and thematically and suggests that science emerged as one of many different "ways of knowing" both the material and immaterial world. We will explore questions such as: How have cultural, economic, historical, political, religious, and social forces shaped the production of knowledge? Who has contributed to what we call "modern science," and who has been omitted—and why—from the dominant historical record? How has science intersected or collided with other ways of knowing the world? How have social markers of difference, such as race, class, gender, disability, shaped modern science? How has science garnered authority and established trust and, conversely, how has it garnered increased scrutiny?

This course does not require any previous background in history or the history of science, technology, and/or medicine.

Learning Goals

Students who successfully complete this course will be able to:

- Articulate how science has been understood across a range of time periods and geographies.
- Explain how broader social forces have shaped the development of modern science.
- Recognize how science has intersected and collided with other ways of knowing the world.

Along with introducing students to major debates, questions, and themes in the history of science, students will strengthen the following skills:

- Analyze primary and secondary sources, situating them in their historical context.
- Communicate these complex ideas, questions, and analyses in written and oral form.
- Recognize the contemporary relevance and broader significance of historical sources and events.

Assignments and Evaluation

Participation	**(50%)**
- Reading Responses	(15%)
- Weekly Reflections	(20%)
- In-Class Engagement	(15%)
Research Project	**(50%)**
- Artifact Topic	(5%)
- Artifact Reflection	(10%)
- Artifact Research	(10%)
- Artifact Expertise	(10%)
- Final Project	(15%)

Participation (50%)

Classroom discussions are the heart of this class. They are a chance for you to demonstrate your grasp of the material and a way for us to explore the course's themes collectively. Engaged participation in this course relies on the following components.

a) Reading Responses (15%): Each week, all students will be required to post a response to the readings at least 24 hours before class time. I will post a prompt and guidelines for the response each week. All responses that meet the requirements of the prompt will

receive full credit. Responses that fail to meet all the directions will receive partial credit. Students can drop their lowest reading response grade.

b) Weekly Reflections (20%): Each week, all students will be required to post a reflection of the readings and discussion within 48 hours after our Thursday session. These reflections are not meant to be a summary of the readings and/or discussion but, rather, introduce ideas, themes, and questions that arose for you during the discussion. You can also use this as an opportunity to amend your reading responses; is there anything you would change about them now that you've had a chance to discuss with your classmates?

c) In-Class Engagement (15%): In-class engagement can take myriad forms, including attendance in sessions; responding to questions posed by the instructor and your peers; preparation for our meetings; introducing specific arguments, ideas, or quotes from the readings and lectures into the discussion; listening attentively to your peers; asking questions about the material; allowing everyone the opportunity to speak. You will be assessed on the quality of your contributions, rather than the quantity of your contributions.

Research Project (50%)

a) Artifact Topic (5%, July 11)
b) Artifact Reflection (10%, July 18)
c) Artifact Research (10%, July 25)
d) Artifact Expertise (10%, July 30)
e) Final Project (15%, August 8)

The final research project for this course will be a biographical exploration of a scientific, technological, and/or medical artifact. Your artifact should be as specific as possible. For example, you might be interested in examining keyboards, but you should pick a specific brand, release year, etc. You will begin by providing a personal reflection on this artifact (b), followed by primary and secondary source research on this artifact (c) and an analysis of what kinds of expertise and knowledge comprise an understanding of the artifact. This will culminate in a final project. We will discuss this further in our first session and more detailed instructions will be posted on Canvas.

Course Policies and Practices

Accommodations

If you require an extension, let me know three days prior to the due date to ensure that the extension can be granted. I understand that exceptional and emergency circumstances can arise, and I will do my best to accommodate these occurrences.

Communications

I will respond to emails within 24 hours during the work week. I do not consistently check emails on the weekends; if you email me on the weekend, I will respond within the first 24 hours of the work week. If you have not heard from me within 24 hours, please send me a follow-up.

Students Hours

I am available to meet with students for two hours during the week. Time and location TBD. If you cannot meet with me during these times, please email to arrange an alternative time.

Readings

All materials are listed in the order that I suggest you go through them. Read, watch, listen, or explore all the materials before class. All materials will be uploaded on the course website and will be accessible through the university library. All materials will be free and accessible. Let me know if you are unable to access the course materials for whatever reason.

Course Schedule and Assigned Readings

July 9, Tuesday	*Read (Secondary Source):*
Situating	Chanda Prescod-Weinstein, "Who Is a Scientist?" and "What Is the Point of Science?" in *The Disordered Cosmos: A Journey into Dark Matter, Spacetime, and Dreams Deferred* (New York: Bold Type Books, 2021). Lorraine Daston, "The History of Science and the History of Knowledge," *KNOW: A Journal on the Formation of Knowledge* 1, no. 1 (May 2017):131 – 154. *Submit:* Introductory Survey Reading Response 1 (due 24h before class)
July 11, Thursday Colonizing	*Read (Secondary Sources):* Palmira Fontes da Costa and Henrique Leitão, "Portuguese Imperial Science, 1450 – 1800," in Daniela Bleichmar et al., *Science in the Spanish and Portuguese Empires, 1500 – 1800* (Stanford, CA: Stanford University Press, 2009), 35 – 53.

	Daniela Bleichmar, "The Imperial Visual Archive: Images, Evidence, and Knowledge in the Early Modern Hispanic World," *Colonial Latin American Review* 24, no. 2 (September 2015): 236 – 266. *Submit:* Reading Response 2 (due 24h before class) Weekly Reflection 1 (by July 13 at 3:50 EST) Artifact Topic
July 16, Tuesday Experimenting	*Read (Secondary Sources):* Steve Shapin, "Pump and Circumstance: Robert Boyle's Literary Technology," *Social Studies of Science* 14, no. 4 (1984): 481 – 520. Harun Küçük, "Early Modern Ottoman Science: A New Materialist Framework," *Journal of Early Modern History* 21, no. 5 (October 2017): 407 – 419. *Listen:* "Science and the Supernatural in the 17th Century," *Distillations,* 29 July 2015, The Science History Institute. *Submit:* Reading Response 3 (due 24h before class)
July 18, Thursday Revolutionizing	*Read (Secondary Sources):* Harold J. Cook, "Problems with the World Made Flesh: The Great Tradition of the Scientific Revolution in Europe," *Journal of Early Modern History* 21, no. 5 (October 2017): 394 – 406. Jorge Cañizares-Esguerra, "On Ignored Global 'Scientific Revolutions'," *Journal of Early Modern History* 21, no. 5 (October 2017): 420 – 432. *Optional:* James Secord, "Inventing the Scientific Revolution," *Isis* 114, no. 1 (March 2023): 50 – 76. *Submit:*

	Reading Response 4 (due 24h before class) Weekly Reflection 2 (by July 20 at 3:50 EST) Artifact Reflection
July 23, Tuesday Classifying	*Read (Secondary Sources):* James Delbourgo, "The Newtonian slave body: Racial enlightenment in the Atlantic World," *Atlantic Studies* 9, no. 2 (June 2012): 185 – 207. Londa Schiebinger, "Why Mammals Are Called Mammals: Gender Politics in Eighteenth-Century Natural History," *American Historical Review* 98, no. 2 (April 1993): 382 – 411. *Submit:* Reading Response 5 (due 24h before class)
July 25, Thursday Ordering	*Read (Secondary Sources):* Kimberly A. Hamlin, "'The Case of a Bearded Woman': Hypertrichosis and the Construction of Gender in the Age of Darwin," *American Quarterly* 63 (December 2011): 955 – 981. Marwa Elshakry, "Global Darwin: Eastern Enchantment," *Nature* 461, no. 7268 (28 October 2009): 1200 – 1201. *Read (Primary Source):* Charles Darwin, *Origin of Species,* (London: John Murray, 1859, reprinted ed. Harvard University Press, 1964), selections. *Optional:* Erika Lorraine Milam and Suman Seth, "Descent of Darwin: Race, Sex, and Human Nature," *British Journal of the History of Science Society Themes* (January 2021): 1 – 8. *Submit:* Reading Response 6 (due 24h before class)

	Weekly Reflection 3 (by July 27 at 3:50 EST) Artifact Research
July 30, Tuesday Materializing	*Read (Secondary Sources):* Christopher Heaney, "Skull Walls: The Peruvian Dead and the Remains of Entanglement," *The American Historical Review* 127, no. 3 (September 2022): 1071 – 1101. Robyn d'Avignon, "Spirited Geobodies: Producing Subterranean Property in Nineteenth-Century Bambuk, West Africa," *Technology and Culture* 16, no. 2 supplement (2020): S20 – S48. *Listen:* "Ghost Hunting in the 19th Century," *Distillations*, 6 July 2021, The Science History Institute. *Read (Primary Source):* Marie Curie, "Radium and the New Concepts in Chemistry," Nobel Lecture, 11 December 1911. *Optional:* Mirjam Brusius, "The Field in the Museum: Puzzling Out Babylon in Berlin," *Osiris* 32, no. 1 (2017): 264 – 285. *Submit:* Reading Response 7 (due 24h before class) Artifact Expertise
August 1, Thursday Measuring	*Explore:* *Image Archive on the American Eugenics Movement.* Each student will be assigned a section to examine. *Read (Secondary Sources):*

	Iris Clever, "Biometry against Fascism: Geoffrey Morant, Race, and Anti-Racism in Twentieth-Century Physical Anthropology," *Isis* 114, no. 1 (March 2023): 25 – 49. Dan Bouk, "The History and Political Economy of Personal Data over the Last Two Centuries," *Osiris* 32, no. 1 (2017): 85 – 106. *Submit:* Reading Response 8 (due 24h before class) Weekly Reflection 4 (by August 3 at 3:50 EST)
August 6, Tuesday Computing	*Listen:* Episode 8: "Cybernetic Revolutionaries," with Eden Medina, *Ventricles, BBQ+.* *Read (Secondary Sources):* Kelcey Gibbons, "Inventing the Black Computer Professional," in *Abstractions and Embodiments: New Histories of Computing and Society,* Janet Abbate and Stephanie Dick, eds. (Baltimore: Johns Hopkins University Press, 2022), 257 – 276. Elizabeth Petrick, "The Computer as Prosthesis? Embodiment, Augmentation, and Disability," in *Abstractions and Embodiments: New Histories of Computing and Society,* Janet Abbate and Stephanie Dick, eds. (Baltimore: Johns Hopkins University Press, 2022), 399 – 415. *Submit:* Reading Response 9 (due 24h before class)
August 8, Thursday Identifying	*Read (Secondary Sources):* Banu Subramaniam, "Biocitizenship in Neoliberal Times: On the Making of the 'Indian' Genome," in *Holy Science: The Biopolitics of Hindu Nationalism* (Seattle: University of Washington Press, 2019), 145 – 177. Vivette García Deister, "Critical Contacts: Making STS Public and Mexico's Forensic Crisis," *Tapuya* 6, no. 1 (2023): 1 – 8.

Projit Bihari Mukharji, et al. “A Roundtable Discussion on Collecting Demographics Data,” *Isis* 111, no. 2 (June 2020): 310 – 353.

Submit:

Reading Response 10 (due 24h before class)

Final Project