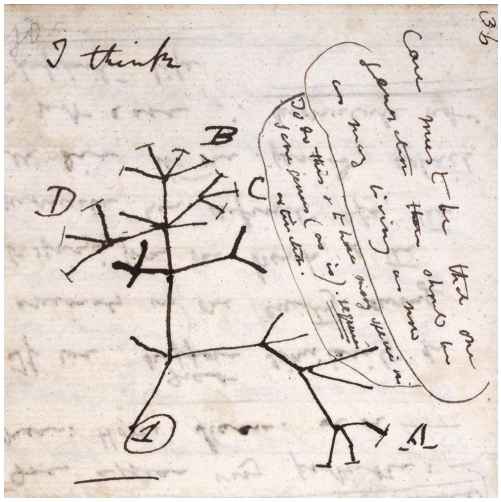
ARTH 252 | The History of the Experiment

SPRING 2018
M/W 11:50 am - 1:10 pm | RKC 100



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Office Hours:
Drop-in every Monday 1:10-2:30 pm
Or, by appointment (please email)
Google Classroom Code: 3o63c36
Course Website: https://courseblogs.bard.edu/art252s18/

Description:
The scientific method and the modern form of the scientific experiment are arguably the most powerful innovations that shape the modern period. Their present recognizable forms emerged only in the sixteenth century, but the concept of the experiment, as an attempt to find underlying continuities in experience, has numerous origins stretching back to earliest recorded civilizations. In large part, the history of these scientific developments in western civilization privileges the philosophical underpinnings in "cosmology" and "natural history." However, a significant and often overlooked aspect of these investigations relied on visual and spatial experience. Throughout this course we will examine the concept of experiment by studying the history of science as it developed and was received through the act of making. Throughout this course we will ask how philosophy and materiality are interdependent in the production of knowledge.

As a major component of the course, we will explore this history through a series of projects: some that replicate the lessons of the scientists we will study and some that will provide opportunities for our own experimentation and discovery. This course is required for those who wish to concentrate in Experimental Humanities.

Goals:
- to provide an overview of major developments in the history of western science
- to relate key moments in the history of science with experiments in visual or spatial production
- to make familiar the act of making and visual culture in the context of humanities text-based studies

Objectives:
- to recognize and critically comment on scientific developments in western science
- to identify visual and spatial experiments within a philosophically-centered text
- to replicate past scientific experiments
- to explore primary source material through image and text annotations, sound essays, drawing, and data

Assignments

25%	**Class Participation**
	Attendance: deduction in grade after 3 unexcused absences (see policy under *Responsibilities & Etiquette* section) Participation: discussions, activities, and informal writing exercises Tutorials: completed in class
40%	**Experiments (2), Experiences (3), and In-class Projects (3)**
8 TOTAL	These are completed during our class time. Note that for experiments and experiences, reading and listening to the material before class is required. Assignments and rubrics will be distributed and posted online with each assignment.
35%	**Multi-week Projects**
5 TOTAL	These are completed as homework. They will require some skill-building to use the digital tools. Tutorials will be provided in class. Assignments and rubrics will be distributed and posted online with each assignment.

Completing the work: A good portion of the work for this course will require you to use different digital platforms that we will learn together during the semester. You DO NOT have to know these programs before the class begins. But, you will need to be in class to learn how to use them so that you can complete the assignments. You may bring your own laptop or you may use the lab's computers. All work will be completed using online platforms.

Submitting work: All due dates for assignments are highlighted in the Course Calendar (in this hard copy and on the course blog) and on our Google Classroom. Unexcused late submission of assignments will result in a reduced grade, ***5% each day*** it is late. In-class assignments may be made up ***ONLY*** with a note from a doctor/health professional or other campus authority. Missing class for early departure for spring break, etc. results in an absence and missed work.

Since Bard is now a Google Educate campus, all readings are stored on Google Team Drive. No books are required for this course. All writing assignments will be submitted using Google Classroom or posted on the course blog. Refer to assignments for specific instructions.

***** Note on Plagiarism *****

With the incredible accessibility of information at our fingertips, it is extremely important to remain vigilant against instances of plagiarism. To quote from the Bard handbook: "To plagiarize is to 'steal and pass off as one's own the ideas, words, or writings of another' (Merriam-Webster). This dictionary definition is quite straightforward, but it is possible for students to plagiarize inadvertently if they do not carefully distinguish between their own ideas or paper topics and those of others. The Bard faculty regards acts of plagiarism very seriously." Likewise, plagiarism is treated very seriously in this class. Any act of plagiarism will result in an F

(zero) for the assignment. To read more on guidelines to avoid plagiarizing someone else's work, see: http://inside.bard.edu/doso/handbook/index.php?aid=1201&sid=705

Responsibilities and Etiquette:

Ideally, you should be present (in mind and body) for every class and on time. If you have to miss, please let me know in advance by email for consideration of an excused absence. I will reserve the right to judge whether an absence should be excused. Any unexcused absences will directly affect your in-class participation grade (which in total is worth two letter grades) and may affect your project grades because you will miss time devoted in class to complete these assignments. Three unexcused absences will result in a deduction of 15% of the participation grade, with every subsequent absence resulting in an additional 5% of the participation grade. Unless the absence is legitimately excused, no make-up tutorials are offered. In-class assignments may be made up ***ONLY*** with a note from a doctor/health professional or other campus authority.More than five minutes late to class is considered an unexcused absence.

It is important that you arrive to class on time and prepared for the day's activities: ready to take notes, to discuss the readings, and participation in class activities. If you use a laptop for taking notes or referring to your annotated readings, refrain from surfing the web. This is not the time to shop, check email, social media, and other distractions from class activities.

Refrain from using your phone during class.

In keeping up with class assignments, it is your responsibility to track the due dates and plan your time as it works best for you. The dates are listed in the Course Calendar below as well as on the assignment prompts that will be distributed in class and posted on the course blog under the tab: Assignments.

The best way to stay in contact with me outside of class is by email. I will respond as promptly as possible, but please note that I do not respond to emails after 7:00 pm and before 9:00 am Monday - Friday, and you may not receive a response from me on the weekends until Monday morning. Please plan your correspondence accordingly.

When writing emails to you, I strive to maintain a level of courtesy and respect by beginning the email with a proper salutation such as "Dear Name" or "Hi Name." I ask that you return the favor and **do *not* address emails with "Hey Professor" or simply "Hey."**

This class requires you to use a number of web platforms. Each of these platforms will be discussed in class. If you have trouble with any of the platforms, it is your responsibility to email or see me (office hours, EH Open Labs, before/after class time) immediately and do not wait until the assignment is due. *This syllabus is subject to change. You will be notified of all modifications to assignments by email and in class. The changes will be reflected in the course blog and on Google Classroom.*

COURSE CALENDAR

WEEK 1

M | January 29

Introduction | Syllabus | Projects Overview

W | January 31

David C. Lindberg, "Science before the Greeks," in *The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious, and Institutional Context, Prehistory to A.D. 1450*, 2nd ed. (Chicago: University of Chicago Press, 2007), 1-20.

Harold Cook, Pamela H. Smith, and Amy R. W. Meyers, "Introduction: Making and Knowing," in *Ways of Making and Knowing: The Material Culture of Empirical Knowledge*, eds. Pamela H. Smith, Amy R. W. Meyers, and Harold J. Cook (Ann Arbor: University of Michigan Press, 2014), 1-6 (optional 7-13).

WEEK 2

M | February 5

Plato, "Timaeus [excerpt]," and Commentary, in *Space from Zeno to Einstein: Classic Readings with a Contemporary Commentary* (Cambridge, MA: MIT Press, 1999), 1-14.

Lindberg, "The Greeks and the Cosmos," in *The Beginnings of Western Science*, 21-44.

W | February 7

Aristotle, "Physics" and "On the Heavens" [excerpts] with Commentary, in *Space from Zeno to Einstein*, 53-84.

Lindberg, "Aristotle's Philosophy of Nature," in *The Beginnings of Western Science*, 45-66.

EXPERIMENT: Rom Harré, "Aristotle: The Embryology of the Chick," in *Great Scientific Experiments: Twenty Experiments that Changed our View of the World* (Oxford: Oxford University Press, 1983), 25-32.

WEEK 3

M | February 12 Lindberg, "Islamic Science," in *The Beginnings of Western Science,* 163-192.

Jim, Al-Khalili, "Optics: The True Nature of Light," *Science in a Golden Age* Series from *Al* Jazeera [video]

W | February 14

David C. Lindberg, "Alhazen's Theory of Vision and Its Reception in the West," *Isis* 58, no. 3 (Autumn 1967), 321-341.

Selections from late 13th century optics: Alhazen, Roger Bacon, and Witelo, in *A Source Book in Medieval Science,* ed. Edward Grant (Cambridge: Harvard University Press, 1974), 399-405, 413-422.

PROJECT (in-class): optics

WEEK 4

M | February 19

Lindberg, "The Medieval Cosmos," in *The Beginnings of Western Science*, 254-285.

David Woodward, "Reality, Symbolism, Time, and Space in Medieval World Maps," *Annals of the Association of American Geographers* 75, no. 4 (December 1985), 510-521.

W | February 21

John Williams, "Isidore, Orosius and the Beatus Map," *Imago Mundi* 49 (1997), 7-32.

PROJECT (assignment): mapping

WEEK 5

M | February 26

Lindberg, "The Mathematical Sciences in Antiquity," in *The Beginnings of Western Science*, 82-110.

Antonio di Tuccio Manetti, *The Life of Brunelleschi*, trans. Catherine Enggass (University Park: The Pennsylvania State University Press, 1970), 34-46.

W | February 28

Leon Battista Alberti, "Book One," in *De pictura [On Painting]*, trans. John R. Spencer (Westport, CT: Greenwood Press, Publishers, 1966), 43-59.

J.V. Field, "Mathematics and the craft of painting: Piero della Francesca and perspective," in *Renaissance and Revolution: Humanists, scholars, craftsmen and natural philosophers in early modern Europe*, eds. J.V. Field and Frank A.J.L. James (Cambridge: Cambridge University Press, 1993), 73-95.

PROJECT (in-class): drawing

WEEK 6

M | March 5

Peter Dear, "'What Was Worth Knowing in 1500," in *Revolutionizing the Sciences: European Knowledge and Its Ambitions, 1500-1700* (Princeton, NJ: Princeton University Press, 2009), 10-28.

James S. Ackerman, "Leonardo Da Vinci: Art in Science," *Daedelus* 127, no. 1 (Winter 1998), 207-224.

W | March 7

Ivor B. Hart, "Artificial Flight and the Flight of Birds," in *The World of Leonardo da Vinci: Man of Science, Engineer and Dreamer of Flight* (New York: The Viking Press, 1961), 307-339.

PROJECT (in-class): Visit to Field Station/visual

WEEK 7

M | March 12

Dear, "Humanism and Ancient Wisdom: How to Learn Things in the Sixteenth Century," in *Revolutionizing the Sciences*, 29-46.

Nicolaus Copernicus, *On the Revolutions of the Heavenly Spheres, Book I*

Ptolemy, *Almagest, Book I*

W | March 14

Denis Cosgrove, "Images of Renaissance Cosmography, 1450-1650," in *The History of Cartography, vol. 3: Cartography in the Renaissance, Part 1*, ed. David Woodward (Chicago: University of Chicago Press, 2007), 55-98.

Chaucer, *A Treatise on the Astrolabe: Parts I and II*, ed. James E. Morrison.

Jim Al-Khalili, "Astronomy: The Science of the Stars," *Science in a Golden Age* Series from *Al Jazeera* [video]

Tom Wujec, "Learn to Use a 13th-century Astrolabe," *TEDGlobal 2009* [video]

PROJECT (due): mapping | PROJECT (assignment): astrolabe

Spring Break

WEEK 8

M | March 26

Dear, "The Alchemist, The Scholar, and the Craftsman," in *Revolutionizing the Sciences*, 47-63.

Francis Bacon, *Novum Oragnum,* ed. Joseph Devey (New York: P.F. Collier & Son, 1902). Introduction and excerpts from the aphorisms in Book I.

W | March 28

Pamela H. Smith, "Making as Knowing: Craft as Natural Philosophy," in *Ways of Making and Knowing*, 17-47.

Londa Schiebinger, "Maria Winkelmann at the Berlin Academy: A Turning Point for Women in Science," *Isis* 78, no. 2 (June 1987), 174-200.

PROJECT (due): astrolabe | PROJECT (assignment): sound

WEEK 9

M | April 2

Dear, "Mathematics Challenges Philosophy: Galileo, Kepler, and the Surveyors," in *Revolutionizing the Sciences*, 64-78.

Mary G. Winkler and Albert Van Helden, "Representing the Heavens: Galileo and Visual Astronomy," *Isis* 83, no. 2 (June 1992), 195-217.

W | April 4

Kathleen M. Crowther and Peter Barker, "Training the Intelligent Eye: Understanding Illustrations in Early Modern Astronomy Texts," *Isis* 104, no. 3 (September 2013), 429-470.

Galileo Galilei, *Siderius Nuncius, or the Sidereal Messenger*, tr. by Albert van Helden (Chicago: Univ. of Chicago Press, 1989)

EXPERIMENT: Harré, "Galileo Galilei: The Laws of Descent," in *Great Scientific Experiments*, 68-73.

WEEK 10

M | April 9

Dear, "Mechanism and Corpuscules: Descartes Builds a Universe," in *Revolutionizing the Sciences*, 79-98.

René Descartes, "The Principles of Philosophy [excerpt]," and Commentary, in *Space from Zeno to Einstein*, 91-106.

W | April 11

René Descartes, "Rules for the Direction of the Mind [excerpt]," from *Architectural Theory: An Anthology from Vitruvius to 1870*, ed. Harry Francis Mallgrave (Malden, MA: Blackwell Publishing, 2006), 61-62.

Selections from Vitruvius *On Architecture*, in *Architectural Theory,* 11-14.

Selections from François Blondel and Claude Perrault, in *Architectural Theory*, 70-71, 74-81.

EXPERIENCE: "Solid as a Rock," *Radiolab* (December 21, 2012). [podcast]

WEEK 11

M | April 16

Isaac Newton, "On the Gravity and Equilibrium of Fluids (*De gravitatione*)" and "The Mathematical Principles of Natural Philosophy (The *Principia*)" [excerpts] with Commentary, in *Space from Zeno to Einstein*, 107-142.

Dear, "Cartesians and Newtonians," in *Revolutionizing the Sciences*, 145-163.

W | April 18

REFERENCE DOCUMENT: Isaac Newton, *Opticks: Or, A Treatise of the Reflections, Refractions, and Inflections and Colours of Light, 4th edition* (London: William Innys, 1730).

PROJECT (due): sound | PROJECT (assignment): annotation

WEEK 12

M | April 23

Sandra Herbert, "The Darwinian Revolution Revisited," *Journal of the History of Biology* 38, no. (Spring, 2005), 51-66.

Charles Darwin, "Introduction" and excerpts from "Natural Selection," in *The Origin of Species by Means of Natural Selection* (London: John Murray, 1859), 1-6, 80-87, 109-130.

W | April 25

Jonathan Smith, "Seeing Things: Charles Darwin and Victorian Visual Culture," in *Charles Darwin and Victorian Visual Culture* (Cambridge: Cambridge University Press, 2006), 1-43.

Neil McWilliam, "A Microcosm of the Universe: The Building of the University Museum," *Oxford Art Journal* 1 (1978), 23-27.

EXPERIENCE: "Darwin in Cambridge: from Christ College to the Beagle," *Endless Forms: Darwin, Natural Science and the Visual Arts* Exhibition Podcast Series, Episode 2. [podcast]

Week 13

M | April 30

Advising Day ****NO CLASS****

W | May 2

Dear, "Extra-curricular Activities: New Homes for Natural Knowledge," in *Revolutionizing the Sciences*, 120-126.

Lisbet Koerner, "Goethe's Botany: Lessons of a Feminine Science," *Isis* 84, no. 3 (September 1994), 470-495.

Janice Neri, "Stitches, Specimens, and Pictures: Maria Sibylla Merian and the Processing of the Natural World," in *The Insect and the Image: Visualizing Nature in Early Modern Europe, 1500-1700* (Minneapolis: University of Minnesota Press, 2011), 139-180.

John Ross Delafield, "Violetta Delafield," Montgomery Place Papers, Bard College Archives.

PROJECT (due): annotation | PROJECT (assignment): database

WEEK 14

M | May 7

Albert Einstein, "The Problem of Space, Ether, and the Field in Physics" and Commentary, in *Space from Zeno to Einstein*, 253-266.

Kathleen James, "Expressionism, Relativity, and Einstein," *Journal of the Society of Architectural Historians* 53, no. 4 (December 1994), 392-413.

W | May 9

EXPERIENCE:

"Way to Go, Einstein," *Studio 360* (December 8, 2016)

"Beyond Time," *Radiolab* (Season 1, Episode 4)

WEEK 15

M | May 14

In-class work to finish database

********** **EH SHARE EVENT!! 5-7 PM IN RKC LOBBY** **********