

Harvey Mudd College  
 Department of Humanities, Social Sciences and the Arts  
 Prof. Vivien Hamilton, [vhamilton@hmc.edu](mailto:vhamilton@hmc.edu)

**LECTURE:** Monday and Wednesday 11:00 - 12:15  
 SHAN 1480

**OFFICE HOURS:** Friday 4 – 5pm

**COURSE OVERVIEW**

Drawing on case studies from the history of science, medicine and technology, this course examines some of the most significant changes to the theory and practice of modern science from the 18<sup>th</sup> to the 20<sup>th</sup> century. Four broad sets of questions will connect the material in the course:



1. Have there been revolutions in science, and if so, what are the criteria for a revolution? Do theories, practices, instruments and values all change at the same time? And what has triggered these changes?
2. Is science insulated from society? Have cultural beliefs and social values affected the ways in which scientific ideas have been evaluated? Or the ways in which science has been practiced?
3. How have new scientific ideas and technologies impacted societies and landscapes?
4. Why is the history of science usually the history of Europe and North America? What stories and ways of knowing are we ignoring? What social and political forces have worked to exclude certain groups and individuals from participating in the institutions of science?

**GOALS**

By the end of this course students will:

- be able to identify a number of important changes to the theories, practices and institutions of science and medicine as well as the role of technology in society over the course of the 19<sup>th</sup> and 20<sup>th</sup> centuries
- be able to explain the significance of these changes
- be able to define relevant scientific concepts and place them in their historical context
- learn how to approach a primary source and incorporate evidence from it into a historical argument
- learn how to identify the main argument in a secondary source and critically evaluate the evidence given for that argument

**EVALUATION:**

History Skills Paragraph	5%
Global Science Reflection	5%
Presentation	10%
Participation	10%
Test 1	15%
Test 2	15%
3 Short Argumentative Essays	40% (10%, 15%, 15%)

**COURSE READINGS:** Required readings will be posted to Sakai.

\*\*\* In order to participate fully in discussion please **bring your readings to class.** \*\*\*

**SAKAI:** Copies of the lecture slides will be available the morning of the lecture on Sakai. Posted slides are intended to assist with note-taking as a supplement to lectures but you will find that my slides tend to be sparse. You **must take notes in class** and annotate as you read in order to succeed on the tests. Please consult Sakai regularly to be up-to-date with posted assignments.

**PARTICIPATION (10%):** We will spend some portion of each class discussing the readings in small groups and as a larger class. It is crucial that you do the readings carefully and bring the texts to class in order to contribute meaningfully to these discussions. You should jot down your own ideas and questions as you read. These first reactions will help you to form thesis statements for your essays. You may miss up to two class sessions but any further absences will impact this portion of your final grade.

**PRESENTATION (10%):** You will read an extra assigned reading with a partner and use the reading to teach the class for 10 minutes (8 min. presentation + 2 min. for questions).

**HISTORY SKILLS PARAGRAPH (5%):** This will be a chance to practice skills necessary for successful writing in history. You will write a paragraph demonstrating proper citation, quoting, paraphrasing, etc. **Due:** Wednesday, Sept. 11 at 10pm. If you are asked to revise and resubmit, the revision will be due Monday Sept.16 at 10pm.

**GLOBAL HISTORY OF SCIENCE REFLECTION (5%):** In our final week of class we will react to the question "Is science western?" A 1-2 page reflection responding to this question will be due in class on Dec. 11.

**SHORT ARGUMENTATIVE ESSAYS (800 - 1000 WORDS) (40%):** You will write three short papers over the course of the semester. There will be nine possible topics for these essays. You will choose which three you want to write, **but you must write one of the first two essays.** There will be no extra research required for these papers beyond the course readings. The deadlines are noted in the schedule and essays must be uploaded through assignments on sakai as a .doc or pdf. Your best two essays will be worth 15% each and your least strong essay will be worth 10% of your final grade.

**FEEDBACK ON YOUR WRITING:** I expect that you will seek out **timely** feedback on drafts of your papers by making an appointment with me or the Writing Center. The Writing Center is open Sunday through Thursday evenings from 7-11 and Saturday and Sunday afternoons from 3-5. It is located in Shanahan 1470, just up the walkway from the cafe. You may schedule an appointment through their website, [www.hmc.edu/writingcenter](http://www.hmc.edu/writingcenter), or you may simply drop in during normal hours. If you'd like an appointment outside of normal hours, you may email [writing\\_center@hmc.edu](mailto:writing_center@hmc.edu) with your request.

**TESTS (15%, 15%):** There will be two tests during class time on Monday, Oct. 14 and Wednesday, Dec. 4. These will be closed book but you may use a laptop to compose your answers.

**PRELIMINARY CLASS SCHEDULE (PLEASE CONSULT THE SAKAI  
SCHEDULE IN CASE OF CHANGES)**

**Week 1**

**Sept 4: INTRODUCTION**

- Hasok Chang, "Making and Unmaking Gold: Confessions of an Anti-Alchemist." <http://www.forbiddenhistories.com/hasok-anti-chemist/>

**Week 2**

**Sept. 9: CHEMICAL REVOLUTION**

- Peter Bowler and Iwan Rhys Morus, "The Chemical Revolution," in *Making Modern Science* (1995), p.55 – 78.
- Joseph Priestley, "Two Mice Discover Oxygen" in *Faber Book of Science*, edited by John Carey, p. 40 - 43.
- Take a look at how this excerpt appears in the original publication: Joseph Priestley, *Experiments and Observations on Different Kinds of Air, Volume 2 (1776)*, starting on p.29. <https://archive.org/details/experimentsobser02prie>

Extra Reading:

- Trevor Levere, "Different Kinds of Air," in *Transforming Matter* (2003), p. 51 - 65.

**Sept. 11: CHEMICAL REVOLUTION**

- Antoine Lavoisier, "The Elements of Chemistry" in *Scientific Revolutions*, edited by Brian Baigrie, p. 165 - 174.
- Jan Golinski, "The Chemical Revolution and the Politics of Language," *The Eighteenth Century* 33 (1992) p.238 - 250.

Extra Reading:

- Priestley, "Considerations on the Doctrine of Phlogiston" in *A History of Science in Society* (2007), Edited by Andrew Ede and Lesley Cormack, p. 208- 211.

***Skills Paragraph due Wednesday, Sept. 11 at 10pm.***

**Week 3**

**Sept.16: NATURAL HISTORY and EVOLUTION**

- Londa Schiebinger, "Theories of Gender and Race," in *Nature's Body: Gender in the Making of Modern Science* (2008), p. 143 - 183.

Presentations:

1. Schiebinger, "Prospecting for Drugs: European Naturalists in the West Indies," in *The Postcolonial Science and Technology Studies Reader* (2011), edited by Sandra Harding p.110 - 123.

- Schiebinger, "West Indian Abortifacients and the Making of Ignorance," in *Agnotology: The Making and Unmaking of Ignorance* (2008), p. 149 - 159.

***Skills Paragraph Resubmission Due Monday, Sept. 16 at 10pm (if necessary)***

**Sept. 18: NATURAL HISTORY and EVOLUTION**

- Bowler and Morus, "The Darwinian Revolution," in *Making Modern Science* (2005), p.129 - 164.
- Lamarck, "Directed Variation" in *Scientific Revolutions*, edited by Brian Baigrie, p. 165 - 174.

Extra Reading

- Paley, *Natural Theology* (1802), p. 1 - 35.
- Adrienne Mayor, "Suppression of Indigenous Fossil Knowledge," in *Agnotology: The Making and Unmaking of Ignorance* (2008), p. 163 - 182.

***Paper 1 (Chemistry) due Friday, September 20 at 10 pm.***

**Week 4**

**Sept. 23: NATURAL HISTORY and EVOLUTION**

- Charles Darwin, *Origin of Species* (1859) (selection)
- Charles Darwin, *Descent of Man* (1871) (selection)

Extra Reading

- Darwin, *The Voyage of the Beagle* <https://ccl.on.worldcat.org/oclc/441347348>
- The Darwin Correspondence Project: <https://www.darwinproject.ac.uk>
- Charles Lyell, *Principles of Geology* (1830 - 33): <http://www.esp.org/books/lyell/principles/facsimile/>

**Sept. 25: NATURAL HISTORY and EVOLUTION**

- James Hull, "Darwin and His Critics" and Adam Sedgwick, "Objections to Mr. Darwin's Theory of the Origin of Species" in *Darwin*, 3rd Edition (2001), p. 257 - 267.
- Fleeming Jenkin, "Review of *Origin of Species*" (1867)

Extra Reading:

- Peter Bowler, *Evolution: The History of an Idea* (2003)
- Michael Ruse, *The Darwinian Revolution* (1999)
- Cynthia Russet, "Hairy Men and Beautiful Women," in *Sexual Science* (1989): p. 78 - 103.

Presentations:

- Jan Sapp, "Darwinism and Sociopolitical Thought," in *Genesis: The Evolution of Biology* (2003), p. 43 - 54.
- Matthew Tontono, "The Scopes Trial Revisited," *Science as Culture* 17 (2008), p. 121-143.

**Week 5****Sept. 30: HEREDITY**

- Francis Galton, "Hereditary Genius" in *A History of Science in Society* (2007), Edited by Andrew Ede and Lesley Cormack, p.263 - 270.
- Stephen Jay Gould, "Measuring Bodies," in *The Mismeasure of Man* (1996), p. 142 - 175.

**Oct. 2: HEREDITY**

- Jan Sapp, "Mendel Palimpsest," in *Genesis: The Evolution of Biology* (2003), p. 117 - 129.
- Mendel, "Experiments in Plant Hybridization," in *Mendel's Principles of Heredity* (1902) by William Bateson (read at least p.40-57 and take a look at Bateson's introduction). [https://archive.org/details/mendelsprinciple00bate\\_0](https://archive.org/details/mendelsprinciple00bate_0)

Presentations:

5. Robert E. Kohler, "Moral Economy, Material Culture, and Community in *Drosophila* Genetics," *The Science Studies Reader* (1999), p. 243 - 257.
6. W.Malcolm Burns, "Ernest Everett Just," *ASBMB* Feb. 2010  
<http://www.asbmb.org/asbmbtoday/asbmbtoday.aspx?id=5878> and Sara P. Diaz, "Zoologist Roger Arliner Young and the Politics of Respectability," *Black Perspectives* (April 25, 2017) <https://www.aaihs.org/zoologist-roger-arliner-young-and-the-politics-of-respectability/>

***Paper 2 (Evolution) due Friday, Oct. 4 at 10 pm.***

**Week 6****Oct. 7: HEREDITY**

- Evelyn Fox Keller, "Language and Science" in *Refiguring Life* (1995), p. 3 - 32.
- Start reading: Watson, *The Double Helix*.

**Oct. 9: HEREDITY**

- James Watson, *The Double Helix* (Selection).
- Watson and Crick, "Molecular Structure of Nucleic Acids," *Nature* 171 (1953), p. 737 - 738.

Extra Reading:

- Reviews of *The Double Helix*, in *The Double Helix* (1980).
- Maurice Wilkins, "Molecular Structure of Deoxyribonucleic Acids." *Nature* 171 (1953), p. 738 - 740.

Presentations:

7. Sarah Richardson, "A chromosome for maleness," in *Sex Itself* (2013), p. 81-102.
8. Daniel Kevles, "Genetics, Race and IQ: Reflections from Binet to the Bell Curve," *Contention* 5 (1995): 3 - 18.

***Essay 3 (Mendel) Due Friday, Oct. 11 at 10pm.***

**Week 7****Oct. 14: TEST 1****Oct. 16: MEDICINE**

- Michel Foucault, "The Birth of the Clinic," in *Medicine and Western Civilization* (1995), edited by David Rothman, et al., p. 376 - 379.
- Ignaz Semmelweis, *The Etiology of Childbed Fever*, p. 63 - 92.

## Extra Reading

- Bowler and Morus, "Science and Medicine," in *Making Modern Science* (2005), p. 439 - 461.
- Jacalyn Duffin, "Science of Suffering: History of Pathology," in *History of Medicine* 2nd Ed (2010): 63 - 97.

**Week 8****Oct. 21: NO CLASS (FALL BREAK)****Oct. 23: MEDICINE**

- Warwick Anderson, "Excremental Colonialism," in *Colonial Pathologies* (2006), p. 104 - 129.

Presentations:

9. Paul Sutter, "Tropical Conquest and the Rise of the Environmental Management State: The Case of U.S. Sanitary Efforts in Panama," p. 317 - 326.
10. Gabriela Soto Laveaga, "The Conquest of Molecules: Wild Yams and American Scientists in Mexican Jungles," p. 309 - 316.  
Both in *Colonial Crucible: Empire in the Making of the Modern American State* (2009), edited by Alfred W. McCoy, Francisco A. Scarano.

***Essay 4 (Double Helix) Due Friday, Oct. 25 at 10pm.*****Week 9****Oct. 28: MEDICINE**

- Jones, "A Moral Astigmatism," in *Bad Blood: The Tuskegee Syphilis Experiment* (1993), p. 1-15.
- "Hearings before the Senate Subcommittee on Health: Human Experimentation, 1973," in *Medicine and Western Civilization* (1995), edited by David Rothman, et al. p. 330 - 340.

## Extra Reading:

- Vonderlehr et al, "Untreated Syphilis in the Negro Male," *JAMA* (1936)

Presentations:

11. Harriet A. Washington, "The Black Stork: The Eugenic Control of African American Reproduction," in *Medical Apartheid* (2006), p. 189 - 213.
12. Eileen Welsome, *The Plutonium Files*, p. 1 - 11, 124-127, 136-148, 157-162.

**Oct. 30: MODERN PHYSICS**

- Helge Kragh, "Einstein's Relativity and Others'," in *Quantum Generations*, p. 87 - 93.
- Collins and Pinch, "Two Experiments that Proved Relativity," in *The Golem*, p. 27-42 (Part 1).

## Extra Reading:

- Albert Einstein, "On the Electrodynamics of Moving Bodies" (1905).
- Albert Michelson and Edward Morely, "On the Relative Motion of the Earth and the Luminiferous Ether," (1887).
- Dyson, Eddington and Davidson, "A Determination of the Deflection of Light by the Sun's Gravitational Field," (1920).

**Week 10****Nov. 4: MODERN PHYSICS**

- Kragh, "Einstein's Relativity," p. 93 - 104.
- "Revolution in Science," *The Times* (Nov. 7, 1919)
- "Einstein on his Theory," *The Times* (Nov. 18, 1919)

Presentations:

13. Katy Price, "Light Caught Bending: Relativity in the Newspapers," in *Loving Faster than Light* (2012): 16 - 41.
14. Margaret Rossiter, "'Women's Work' in Science," in *Women Scientists in America* Vol. 1, p. 51 - 72.

**Nov. 6: MODERN PHYSICS**

- Julie Des Jardins, "Madame Curie's American Tours" p. 23 - 52.
- Eve Curie, "The Colour of Radium"

Presentations:

15. Helge Kragh, "Physics and the New Dictatorships," in *Quantum Generations* (1999): 230-244.
16. Matthew Lavine, *The First Atomic Age* (2013): 145 - 181.

***Essay 5 (Medicine) Due Friday, Nov. 8 at 10pm.***

**Week 11****Nov. 11: THE BOMB**

- Sime, "Lise Meitner and the Discovery of Nuclear Fission," p. 80-85.
- Misa, "The Means of Destruction," p.190-210.

**Nov. 13: HSA ADVISING (NO CLASS)**

***Essay 6 (Relativity) Due Friday, Nov. 15 at 10pm.***

**Week 12****Nov. 18: THE BOMB**

- The Franck Report
- Feynman, "A Death and the Bomb"
- Oppenheimer, "Speech at Los Alamos"

## Extra Reading:

- Documents on the decision to drop the bomb:  
<http://www.dannen.com/decision/index.html>
- *The Day After Trinity* (1981): <https://www.youtube.com/watch?v=Vm5fCxXnK7Y>

Presentations:

17. Susan Lindee, "Atonement: Understanding the No-Treatment Policy of the Atomic Bomb Casualty Commission," *Bulletin of the History of Medicine* 68 (1994): 454-490.
18. David Cassidy, "Taming the Endless Frontier," in *A Short History of Physics in the American Century* (2011): 90 - 105.

**Nov. 20: 20th C TECHNOLOGY**

- Ruth Schwartz Cowan and Matthew Hersch, "Automobiles and Automobility," in *A Social History of American Technology* 2nd Ed (2018), p. 194 - 224.

Presentations:

19. Cowan, "The industrial revolution in the home," in *The Social Shaping of Technology* 2nd Ed. (1999), p. 281 - 297.
20. Cowan and Hersch, "Electronic Brains and Global Villages," in *A Social History of American Technology* 2nd Ed (2018), p. 275 - 298.

***Essay 7 (Curie) Due Friday, Nov. 22 at 10 pm.***

**Week 13****November 25: TOXIC LANDSCAPES**

- Carolyn Merchant, "The Era of Environmentalism," in *The Columbia Guide to American Environmental History*, 174 -190.
- Rachel Carson, *Silent Spring* p. 1-23.

Presentations:

21. James Lewis and Char Miller, "Vast Incredible Damage: Herbicides and the US Forest Service," in *Inevitably Toxic*, p. 182 - 206.
22. Valerie A. Olson, "NEO Ecology: The Solar System's Emerging Environmental History and Politics," in *New Natures* (2013): p. 196 - 211.

***Essay 8 (The Bomb) Due Tuesday, Nov. 26 at 10 pm.***

**November 27: NO CLASS**



**Week 14****Dec. 2: CLIMATE CHANGE**

- Naomi Oreskes and Erik Conway, "Challenging Knowledge: How Climate Science Became a Victim of the Cold War," in *Agnotology: The Making and Unmaking of Ignorance* (2008), p. 55-80.

**Dec. 4: TEST 2****Week 15****Dec. 9: WAYS OF KNOWING**

- **Group 1:** Ward Goodenough, "Navigation in the Western Carolines," p. 159 - 174.  
**OR**
- **Group 2:** Colin Scott, "Science for the West, Myth for the Rest? The Case of James Bay Cree Knowledge Construction" p. 175 - 197.  
(Both in *The Postcolonial Science and Technology Studies Reader* (2011), edited by Sandra Harding.)

**Dec. 11: IS SCIENCE WESTERN?**

- Harding, "Seeing Ourselves as Others See Us," in *Science and Social Inequality* (2006), p.31 - 49.
- ***Global Science Reflection due in class.***

***Essay 9 (Technology and Environment) Due Friday, Dec. 13 at 10 pm.***

### Participation Rubric

You will be graded on the contributions that you make each week to the class discussion. Careful reading and preparation for each class will help you to make thoughtful and meaningful contributions.

**In order to participate fully, you must bring your readings and your reading notes to class.**

A	A-	B	C	D	F
<ul style="list-style-type: none"> <li>• actively supports, engages and listens to peers (ongoing)</li> <li>• arrives fully prepared to every class</li> <li>• continually plays an active role in discussion</li> <li>• comments consistently advance the level and depth of discussion</li> </ul>	<ul style="list-style-type: none"> <li>• actively supports, engages and listens to peers (ongoing)</li> <li>• arrives fully prepared to almost every session</li> <li>• plays an active role in discussion (ongoing)</li> <li>• comments occasionally advance the level and depth of the dialogue</li> </ul>	<ul style="list-style-type: none"> <li>• makes a sincere effort to interact with peers (ongoing)</li> <li>• arrives mostly, if not fully, prepared</li> <li>• participates constructively in discussions (ongoing)</li> <li>• makes relevant comments based on the assigned material</li> </ul>	<ul style="list-style-type: none"> <li>• limited interaction with peers</li> <li>• preparation, and therefore level of participation, are both inconsistent</li> <li>• when prepared, participates constructively in discussions and makes relevant comments based on the assigned material</li> </ul>	<ul style="list-style-type: none"> <li>• virtually no interaction with peers</li> <li>• rarely prepared</li> <li>• rarely participates</li> <li>• comments are generally vague or drawn from outside of the assigned material</li> <li>• demonstrates a noticeable lack of interest (on occasion)</li> </ul>	<ul style="list-style-type: none"> <li>• no interaction with peers</li> <li>• never prepared</li> <li>• never participates</li> <li>• demonstrates an ongoing lack on interest in the material</li> </ul>

Adapted from a rubric presented by Adam Chapnick in *The Teaching Professor* March 2005.